

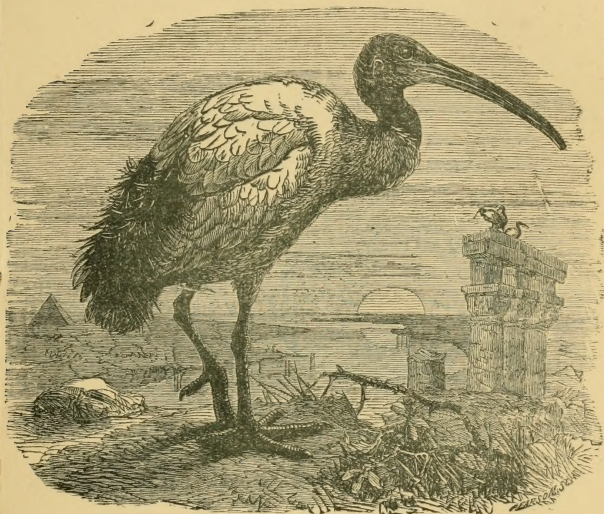


SHOUT
SHARE IT

THE IBIS,
A
QUARTERLY JOURNAL OF ORNITHOLOGY.

EDITED BY

WILLIAM LUTLEY SCLATER, M.A., F.Z.S.



VOL. IV. 1916.

TENTH SERIES.

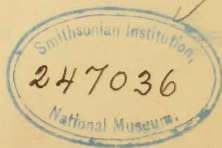
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BRITISH ORNITHOLOGISTS' UNION

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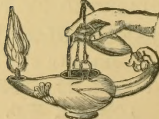
WILLIAM WESLEY & SON, 28 ESSEX STREET, STRAND,
LONDON, W.C.

1916.





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TENTH SERIES.

VOLUME IV.

Number	1.	issued	January	7th.
„	2.	„	April	12th.
„	3.	„	July	3rd.
„	4.	„	October	2nd.

LIST OF THE MEMBERS

OF THE

BRITISH ORNITHOLOGISTS' UNION.

1916.

[An asterisk indicates an Original Member. It is particularly requested that Members should give notice to the Secretary of the Union of any error in their addresses or descriptions in this List, in order that it may be corrected.]

Date of
Election.

- 1916. ADAMS, ERNEST EDWARD ; Lloyd's, Royal Exchange, E.C.
- 1914. ALDORTH, Capt. THOMAS PRESTON.
- 1911. ALEXANDER, CHRISTOPHER JAMES ; International Institute of
Agriculture, Rome, Italy.
- 1911. ALEXANDER, HORACE GUNDRY ; 3 Mayfield Road, Tunbridge
Wells, Kent.
- 5 1888. APLIN, OLIVER VERNON : Stonehill House, Bloxham, Oxon.
- 1896. ARCHIBALD, CHARLES F. ; 2 Darnley Road, West Park,
Leeds, Yorks.
- 1896. ARRIGONI DEGLI ODDI, Count ETTORE, Professor of Zoology,
University, Padua ; and Ca'oddo, Monselice, Padua,
Italy.
- 1901. ARUNDEL, Major WALTER B., F.Z.S. ; High Ackworth, Ponte-
fract, Yorks.
- 1915. ASHBY, EDWIN ; Wittunga, Blackwood, Adelaide, S. Australia.
- 10 1901. ASHBY, HERBERT ; Broadway House, Brookvale Road,
Southampton.
- 1908. ASHWORTH, JOHN WALLWORK, M.R.C.S., L.R.C.P., F.R.G.S.,
F.G.S. ; Thorne Bank, Heaton Moor, near Stockport,
Cheshire.
- 1897. ASTLEY, HUBERT DELAVAL, M.A., F.Z.S. ; Brinsop Court,
Hereford.
- 1885. BACKHOUSE, JAMES, F.Z.S. ; The Old Manor House,
Knaresborough, Yorks.

Date of
Election.

1904. BAHK, PHILIP HEINRICH, M.A., M.B., M.R.C.S., L.R.C.P.,
F.Z.S.; 12 Vicarage Gardens, Kensington, W.
- 15 1901. BAILWARD, Col. ARTHUR CHURCHILL, F.Z.S. (R.F.A.);
64 Victoria Street, S.W.
1892. BAKER, E. C. STUART, F.Z.S.; 6 Harold Road, Upper
Norwood, S.E. (*Hon. Secretary and Treasurer.*)
1901. BAKER, JOHN C., M.B., B.A.; Ceely House, Aylesbury, Bucks.
1889. BALSTON, RICHARD JAMES, F.Z.S.; Springfield, Maidstone,
Kent.
1906. BANNERMAN, DAVID A., B.A., F.R.G.S.; 11 Washington
House, Basil Street, S.W.
- 20 1890. BARCLAY, FRANCIS HUBERT, F.Z.S.; The Warren, Cromer,
Norfolk.
1885. BARCLAY, HUGH GURNEY, F.Z.S.; Colney Hall, Norwich,
Norfolk.
1903. BARTELS, MAX.; Pasir Datar, Halte Tjisait (Preanger), Java,
Dutch East Indies.
1906. BATES, GEORGE L., C.M.Z.S.; Bitye, Ebolowa, Cameroon,
West Africa.
1912. BAXENDALE, FRANCIS RICHARD SALISBURY; Commissioner of
Famagusta, Cyprus.
- 25 1913. BAYNES, GEORGE KENNETH; 120 Warwick Street, S.W.
1912. BEEBE, C. WILLIAM, C.M.Z.S.; Curator of Birds, New York
Zoological Park, New York, U.S.A.
1910. BEESTON, HARRY; Sunnymead, South Street, Havant, Hants.
1897. BENSON, JOHN.
1897. BERRY, WILLIAM, B.A., LL.B.; Tayfield, Newport, Fife-
shire.
- 30 1914. BETHAM, Brigadier-General ROBERT M.; c/o Messrs. Grindlay
& Co., Hornby Road, Bombay, India.
1907. BETHELL, The Hon. RICHARD, F.Z.S. (Scots Guards); 18 Lower
Seymour Street, W.
1907. BICKERTON, WILLIAM, F.Z.S.; The Firs, Farraline Road, Wat-
ford, Herts.
1880. BIDWELL, EDWARD; 1 Trig Lane, Upper Thames Street, E.C.
1892. BIRD, The Rev. MAURICE C. H., M.A.; Brunstead Rectory,
Stalham, S.O., Norfolk.
- 35 1891. BLAAUW, FRANS ERNST, C.M.Z.S.; Gooilust, 'sGraveland,
Hilversum, Noord-Holland.
1913. BLACKWOOD, GEORGE GLENDINNING; Southwood, Peebles.
1912. BLAINE, GILBERT, F.Z.S.; 5 A The Albany, Piccadilly, W.

Date of
Election.

1903. BLATHWAYT, The Rev. FRANCIS LINLEY, M.A.; Doddington Rectory, Lincoln.
1914. BLYTH, ROBERT OSWALD, M.A.; Balvonie, Skelmorlie, Ayrshire.
- 40 1897. BONAR, The Rev. HORATIUS NINIAN, F.Z.S.; 16 Cumin Place, Edinburgh.
1905. BONE, HENRY PETERS.
1894. BONHOTE, JOHN LEWIS, M.A., F.L.S., F.Z.S.; Zoological Gardens, Giza, Egypt; and Gade Spring Lodge, Hemel Hempstead, Herts.
1906. BOORMAN, STAINES; Heath Farm, Send, Woking, Surrey.
1898. BOOTH, GEORGE ALBERT; Whalley Range, Longton, Lanes.
- 45 1904. BOOTH, HARRY B.; Rybill, Ben Rhydding, *via* Leeds, Yorks.
1908. BORRER, CLIFFORD DALISON; 20 Pelham Crescent, South Kensington, S.W.
1915. BRADFORD, ARTHUR DANBY, F.Z.S.; Upton Lodge, Watford, Herts.
1895. BRADFORD, Sir JOHN ROSE, K.C.M.G., M.D., D.Sc., F.R.S., F.Z.S.; 8 Manchester Square, W.
1902. BRIDGEMAN, Commdr. The Hon. RICHARD O. B., D.S.O., R.N.; c/o Commander-in-Chief, Cape of Good Hope Station, c/o G.P.O.
- 50 1909. BRIGGS, THOMAS HENRY, M.A., F.E.S.; Rock House, Lynmouth, R.S.O., N. Devon.
1902. BRISTOWE, BERTRAM ARTHUR; The Cottage, Stoke D'Abernon, Cobham, Surrey.
1908. BROOK, EDWARD JONAS, F.Z.S.; Hoddam Castle, Ecclefechan, Dumfriesshire.
1899. BROOKE, JOHN ARTHUR, J.P.; Fenay Hall, Huddersfield; and Fearn Lodge, Ardgay, Ross-shire.
1912. BROWN, THOMAS EDWARD; c/o Messrs. G. Beyts & Co., 11 Port Tewfik, Suez, Egypt.
- 55 1900. BRUCE, WILLIAM SPEIRS, LL.D., F.R.S.E.; Scottish Oceanographical Laboratory, Surgeon's Hall, Edinburgh.
1914. BUCHANAN, Col. KENNETH (Indian Army); c/o Messrs. Cox & Co., 16 Charing Cross, S.W.
1907. BUCKLEY, CHARLES MARS; 4 Hans Crescent, S.W.
1906. BUCKNILL, Sir JOHN ALEXANDER STRACHEY, K.C., M.A., F.Z.S.; Chief Justice, Straits Settlements; Nassim Hill, Singapore; and Athenæum Club, Pall Mall, S.W.

Date of
Election.

1908. BUNYARD, PERCY FREDERICK, F.Z.S.: 57 Kidderminster Road, Croydon, Surrey.
- 60 1907. BUTLER, ARTHUR GARDINER, Ph.D., F.L.S., F.Z.S.; 124 Beckenham Road, Beckenham, Kent.
1899. BUTLER, ARTHUR LENNOX, F.Z.S.; The Lower Lodge, Brownsover, near Rugby.
1900. BUTTRESS, BERNARD A. E.; Craft Hill, Dry Drayton, Cambridge.
1905. BUXTON, ANTHONY; Knighton, Buckhurst Hill, Essex.
1884. BUXTON, GEOFFREY FOWELL, F.Z.S.; Dunston Hall, Norwich, Norfolk.
- 65 1912. BUXTON, PATRICK ALFRED; Fairhill, Tonbridge, Kent.
1896. CAMERON, Major JAMES S. (2nd Bn. Royal Sussex Regt.); Low Wood, Bethersden, Ashford, Kent.
1888. CAMERON, JOHN DUNCAN; Low Wood, Bethersden, Ashford, Kent.
1909. CAMPBELL, DAVID CALLENDER, J.P.; Templemore Park, Londonderry, Ireland.
1909. CARROLL, CLEMENT JOSEPH; Rocklow, Fethard, Co. Tipperary, Ireland.
- 70 1904. CARRUTHERS, ALEXANDER DOUGLAS M.; 7 Park Place, St. James', S.W.
1908. CARTER, THOMAS; Wensleydale, Mulgrave Road, Sutton, Surrey.
1890. CAVE, Capt. CHARLES JOHN PHILIP, M.A., F.Z.S.; Ditcham Park, Petersfield, Hants.
1913. CHAPLIN, NUGENT; The Lodge, Bourne End, Bucks.
1884. CHAPMAN, ABEL, F.Z.S.; Hounxty, Wark-on-Tyne, Northumberland.
- 75 1882. CHASE, ROBERT WILLIAM; Herne's Nest, Bewdley, Worcestershire.
1908. CHEESMAN, ROBERT E.; c/o F. V. Winch, Esq., North View, Willesley, Cranbrook, Kent.
1910. CHUBB, CHARLES, F.Z.S.; British Museum (Natural History), Cromwell Road, S.W.
1912. CLARK, GEORGE WINGFIELD, M.A., F.Z.S.; 2 Devana Terrace, Huntingdon Road, Cambridge.
1904. CLARKE, Major GOLAND VAN HOLT, D.S.O., F.Z.S.; Chilworth Court, Romsey, Hants.

Date of
Election.

- 80 1916. CLARKE, JOHN PHILIP STEPHENSON; Borde Hill, Cuckfield, Sussex.
1889. CLARKE, Col. STEPHENSON ROBERT, C.B., F.Z.S.; Borde Hill, Cuckfield, Sussex.
1880. CLARKE, WILLIAM EAGLE, LL.D., F.L.S., F.R.S.E.; Royal Scottish Museum, Edinburgh.
1904. COCHRANE, Captain HENRY LAKE, R.N.; Admiralty, Whitehall, S.W.
1898. COCKS, ALFRED HENEAGE, M.A., F.Z.S.; Poynetts, Skirmett, near Henley-on-Thames, Oxon.
- 85 1895. COLES, RICHARD EDWARD; Rosebank, New Milton, S.O., Hants.
1911. COLLETT, ANTHONY KEELING; 5 Stone Buildings, Lincoln's Inn, W.C.
1904. COLLIER, CHARLES, F.Z.S.; Bridge House, Culmstock, Devon; and Windham Club, St. James' Square, S.W.
1916. COLTART, Dr. HENRY NEVILLE; Field House, Epsom, Surrey.
1909. CONGREVE, Capt. WILLIAM MAITLAND (R.A.); The Forest, Kerry, Montgomeryshire.
- 90 1913. COOK, JAMES PEMBERTON; c/o Messrs. Wallace & Co., Bombay Burmah Trading Corporation, Ltd., Bombay, India.
1888. CORDEAUX, Major WILLIAM WILFRID (late 21st Lancers); Hopebourne, Harbledown, Canterbury, Kent.
1914. COURTOIS, The Rev. F. L., S.J.; Curator of the Sikawei Museum, near Shanghai, China.
1913. COWAN, FRANCIS; Wester Lea, Murrayfield, Midlothian.
1894. CREWE, Sir VAUNCEY HARPUR, Bt.; Calke Abbey, Derby.
- 95 1903. CROWLEY, JOHN CYRIL, M.A.; 5 Beech House Road, Croydon, Surrey.
1916. CURRIE, ALGERNON JAMES; Southlands, Winchester Road, Worthing, Sussex; and c/o Messrs. A. Scott & Co., Rangoon, Burma.
1915. CURRIE, ROBERT ALEXANDER (Chinese Customs); The Custom House, Yochow, by Hankow, China.
1899. CURTIS, FREDERICK, F.R.C.S.; Lyndens, Redhill, Surrey.
1896. DANFORD, Capt. BERTRAM W. Y., R.E.; Bermuda.
- 100 1883. DAVIDSON, JAMES, F.Z.S.; 32 Drumsheugh Gardens, Edinburgh.
1905. DAVIS, K. J. ACTON, M.C., F.R.C.S., F.Z.S.; 24 Upper Berkeley Street, W.

Date of
Election.

1915. DAWSON, GEORGE HOGARTH, F.Z.S. : 29 Lansdowne Crescent,
Notting Hill, W.
1909. DELMÉ-RADCLIFFE, Capt. ALFRED (105th Maratha Light
Infantry); Church Hatch, Christchurch, Hants.; and
c/o Messrs. Cox & Co., Bombay, India.
1902. DENT, CHARLES HENRY; c/o Messrs. Barclay & Co. Ltd.,
Darlington, Durham.
- 105 1916. DESPOTT, GIUSEPPE, Curator of the Natural History Museum,
The University, Malta.
1893. DE WINTON, WILLIAM EDWARD, F.Z.S. ; Southover Hall,
Burwash, Sussex.
1896. DOBBIE, JAMES BELL, F.R.S.E., F.Z.S. ; 12 South Inverleith
Terrace, Edinburgh.
1889. DOBIE, WILLIAM HENRY, M.R.C.S. ; 2 Hunter Street,
Chester.
1904. DORRIEN-SMITH, THOMAS ALGERNON, J.P., D.L. ; Tresco Abbey,
Scilly Isles.
- 110 1904. DRAKE-BROCKMAN, RALPH EVELYN, M.R.C.S., L.R.C.P.,
F.Z.S. ; c/o Messrs. Grindlay & Co., 54 Parliament Street,
S.W.
1913. DRUMMOND, JAMES, F.L.S., F.Z.S. ; 'Lyttelton Times,'
Christchurch, New Zealand.
1890. DRUMMOND-HAY, Col. JAMES A. G. R.- (Coldstream Guards);
Seggieden, by Perth.
1904. DUCKWORTH, GEORGE HERBERT; Dalingridge Place, *viâ* East
Grinstead, Sussex.
1878. DURNFORD, W. ARTHUR, J.P. ; Elsecar, Barnsley, Yorks.
- 115 1905. DUTTON, The Hon. and Rev. Canon FREDERICK GEORGE;
Bibury, Fairford, Gloucestershire.
1903. EARLE, EDWARD VAVASOUR; c/o P. B. Cow, Esq., 87 Albe-
marle Road, Beckenham, Kent.
1914. EDWARDS, LAURENCE ALBERT CURTIS, M.A. ; 12 Market Street,
Rye, Sussex.
1895. ELLIOT, EDMUND A. S., M.R.C.S. ; Woodville, Kingsbridge,
South Devon.
1884. ELLIOTT, ALGERNON, C.I.E. ; 16 Belsize Grove, Hamp-
stead, N.W.
- 120 1902. ELLISON, The Rev. ALLAN, M.A. ; Althorpe Rectory, Doncaster,
Yorks.
1866. ELWIS, HENRY JOHN, F.R.S., F.Z.S. ; Colesborne, Cheltenham,
Gloucestershire.

Date of
Election.

1914. ETHERIDGE, ROBERT, Junr., C.M.Z.S.; Curator of the Australian Museum, Sydney, New South Wales, Australia.
1879. EVANS, ARTHUR HUMBLE, M.A., F.Z.S.; 9 Harvey Road, Cambridge.
1888. EVANS, WILLIAM, F.R.S.E.; 38 Morningside Park, Edinburgh.
- 125 1916. EZRA, ALFRED, F.Z.S.; 110 Mount Street, W.
1892. FAIRBRIDGE, WILLIAM GEORGE; 141 Long Market Street, Capetown, South Africa.
1916. FALKINER, Capt. JOHN McINTIRE, I.M.S., F.R.C.S.; 56 Chancery Lane, W.C.
1909. FANSHAWE, Capt. RICHARD D. (late Scots Guards); Broxmore, Cavendish Road, Bournemouth.
1894. FARQUHAR, Rear-Admiral ARTHUR MURRAY, C.V.O.; Granville Lodge, Aboyne, Aberdeenshire.
- 130 1898. FARQUHAR, Capt. STUART ST. J., R.N.; Naval & Military Club, Piccadilly, W.
1873. FEILDEN, Col. HENRY WEMYSS, C.B., C.M.Z.S.; Burwash, Sussex; and Junior United Service Club, S.W.
1908. FINCH-DAVIES, CLAUDE G. (1st S. African Mounted Riflemen); c/o Mrs. Finch-Davies, c/o Mrs. Scott, Beaumont Road, King Williams Town, Cape Colony, South Africa.
1901. FINLINSON, HORACE W., F.Z.S.; 5 Rosamond Road, Bedford.
1885. FITZHERBERT-BROCKHOLES, WILLIAM JOSEPH; Claughton Hall, Garstang, Lancashire.
- 135 1902. FLOWER, Major STANLEY SMYTH, F.Z.S.; Kedah House, Zoological Gardens, Giza, Egypt.
1912. FLOYD, JAMES FRANCIS MURRAY, B.A.; The University, Glasgow.
1884. FORBES, HENRY OGG, LL.D., F.Z.S.; Redcliffe, Beaconsfield, Bucks.
1912. FOSTER, ARTHUR H., M.R.C.S., L.R.C.P.; Sussex House, 88 Tilehouse Street, Hitchin, Herts.
1903. FOSTER, NEVIN HARKNESS, F.L.S., M.R.I.A.; Hillsborough, Co. Down, Ireland.
- 140 1880. FOSTER, WILLIAM; 39 Colville Gardens, Bayswater, W.
1887. FOWLER, WILLIAM WARDE, M.A.; Lincoln College, Oxford.
1865. FOX, The Rev. HENRY ELLIOTT, M.A.; The Croft, Lytton Grove, Putney Hill, S.W.
1881. FREKE, PERCY EVANS; South Point, Limes Road, Folkestone.

Date of
Election.

1895. FROHAWK, FREDERICK WILLIAM, F.E.S.; Stanley House,
Park Road, Wallington, Surrey.
- 145 1909. FROST, WILLIAM EDWARD, J.P.; Ardvreck, Crieff, Perthshire.
1881. GADOW, HANS, Ph.D., F.R.S., F.Z.S.; Cleramendi, Great
Shelford, near Cambridge.
1886. GAINSBOROUGH, CHARLES WILLIAM FRANCIS, Earl of; Exton
Park, Oakham, Rutland.
1907. GANDOLFI, ALFONSO OTHO GANDOLFI-HORNYOLD, Duke, Ph.D.;
Blackmore Park, Hanley Swan, Worcestershire.
1900. GARNETT, CHARLES, F.Z.S.; Greathouse, Chippenham, Wilts;
and New University Club, St. James's Street, S.W.
- 150 1892. GERRARD, JOHN; Worsley, near Manchester, Lanes.
1902. GIBBINS, WILLIAM BEVINGTON, F.Z.S.; Ettington, Stratford-
on-Avon, Warwickshire.
1879. GIBSON, ERNEST, F.L.S., F.Z.S., F.R.G.S.; 25 Cadogan Place,
S.W.
1903. GLADSTONE, Capt. HUGH STEUART, M.A., F.Z.S., F.R.S.E.,
F.S.A.Scot.; Capenoch, Thornhill, Dumfriesshire; and
40 Lennox Gardens, S.W.
1908. GODMAN, Capt. EDWARD SHIRLEY (2nd Dorset Regiment);
Hampsteel, Cowfold, Sussex.
- 155* 1858. GODMAN, FREDERICK DUCANE, D.C.L., F.R.S., F.Z.S.; 45 Pont
Street, S.W.; and South Lodge, Horsham, Sussex.
(*Gold Medallist.*)
- * 1858. GODMAN, PERCY SANDEN, B.A., C.M.Z.S.; Hampsteel,
Cowfold, Sussex. (*Gold Medallist.*)
1906. GOODALL, JEREMIAH MATTHEWS; The Nest, Bembridge, Isle of
Wight.
1900. GOODFELLOW, WALTER, F.Z.S.; The Poplars, Kettering,
Northants.
1906. GORDON, SETON PAUL, F.Z.S.; Auchintoul, Aboyne,
Aberdeenshire.
- 160 1912. GOSSE, Capt. PHILIP, M.R.C.S., L.R.C.P., R.A.M.C.; Curtlee-
mead, Beaulieu, Hants.
1899. GOULD, FRANCIS HERBERT CARRUTHERS, F.Z.S.; Matham
Manor House, East Molesey, Surrey.
1895. GRABHAM, OXLEY, M.A.; The Museum, York.
1909. GRANT, CLAUDE HENRY BAXTER, F.Z.S. (6th Battn. Rifle
Brigade); Hedingham Cottage, Hampton Road, Twicken-
ham; and Sports Club, St. James' Square, S.W.
1913. GREENING, LINNÆUS, F.L.S., F.Z.S.; Fairlight, Grappenhall,
Cheshire.

Date of
Election.

- 165 1909. GREY OF FALLODEN, The Rt. Hon. EDWARD, The Viscount, K.G., P.C., F.Z.S.; Falloden, Christon Bank, R.S.O., Northumberland.
1906. GRIFFITH, ARTHUR FOSTER; 59 Montpelier Road, Brighton, Sussex.
1885. GUILLEMARD, FRANCIS HENRY HILL, M.A., M.D., F.Z.S.; Old Mill House, Trumpington, Cambridge.
1908. GURNEY, GERARD HUDSON, F.Z.S., F.E.S.; Keswick Hall, Norwich, Norfolk.
1870. GURNEY, JOHN HENRY, F.Z.S.; Keswick Hall, Norwich; and Athenæum Club, Pall Mall, S.W.
- 170 1896. GURNEY, ROBERT, F.Z.S.; Ingham Old Hall, Stalham, Norfolk.
1891. HAIGH, GEORGE HENRY CATON, F.Z.S.; Grainsby Hall, Great Grimsby, Lincolnshire.
1887. HAINES, JOHN PLEYDELL WILTON; 17 King Street, Gloucester.
1898. HALE, The Rev. JAMES RASHLEIGH, M.A.; Boxley Vicarage, Maidstone, Kent.
1905. HAMERTON, Major Albert Edward, D.S.O., R.A.M.C., F.Z.S.; c/o Messrs. Holt & Co., 3 Whitehall Place, S.W.
- 175 1913. HARDY, Capt. ERNEST CLIFFORD, R.N.; Hydrographic Department, Admiralty, Whitehall, S.W.
1900. HARPER, EDMUND WILLIAM, F.Z.S.; 6 Ashburnham Road, Bedford.
1900. HARRIS, HENRY EDWARD.
1893. HARTERT, ERNST J. O., Ph.D., F.Z.S.; The Zoological Museum, Tring, Herts.
1868. HARTING, JAMES EDMUND, F.Z.S.; Portmore Lodge, Weybridge, Surrey.
- 180 1893. HARTMANN, WILLIAM; Milburn, Esher, Surrey.
1900. HASLUCK, PERCY PEDLEY HARFORD; The Wilderness, Southgate, N.
1902. HATFIELD, JOHN RANDALL; Edlington Hall, Horncastle, Lincolnshire.
1898. HAWKER, RICHARD MACDONNELL, F.Z.S.; Bath Club, Dover Street, W.; and c/o Messrs. Dalgety & Co., 96 Bishopsgate, E.C.
1905. HAWKSHAW, JOHN CLARKE, M.A., M.I.C.E., F.G.S.; Hollycombe, Liphook, Hants.; and 33 Great George Street, Westminster, S.W.

- Date of Election.
- 185 1905. HEADLEY, FREDERICK WEBB, M.A., F.Z.S.; Haileybury College, Hertford.
1902. HETT, GEOFFREY SECCOMBE, M.B., F.Z.S.; 8 Wimpole Street, W.
1913. HEWITT, JOHN, M.A.; Director of the Albany Museum, Grahamstown, South Africa.
1900. HILLS, Major JOHN WALLER; Brooks' Club, St. James' Street, S.W.
1884. HOLDSWORTH, CHARLES JAMES, J.P.; Fernhill, Alderley Edge, Cheshire.
- 190 1912. HONY, GEORGE BATHURST; 4 Beaufort Road, Clifton, Bristol.
1905. HOPKINSON, EMILIUS, M.B., D.S.O., F.Z.S.; 45 Sussex Square, Brighton, Sussex; and Bathurst, Gambia, West Africa.
1916. HOPWOOD, CYRIL (Indian Forests); c/o Messrs. Thos. Cook & Son, Rangoon, Burma.
1888. HORSFIELD, HERBERT KNIGHT; Crescent Hill, Filey, Yorks.
1895. HOWARD, HENRY ELIOT, F.Z.S.; Clarelands, near Stourport, Worcestershire.
- 195 1881. HOWARD, ROBERT JAMES; Shearbank, Blackburn, Lancashire.
1911. HUDSON, EDWARD; 15 Queen Anne's Gate, S.W.
1911. HUDSON, REGINALD; 16 Warwick Road, Stratford-on-Avon.
1901. INGRAM, Capt. COLLINGWOOD, F.Z.S.; Sussex Mansions, Westgate-on-Sea, Kent.
1902. INNES BEY, Dr. WALTER FRANCIS; Curator of the Zoological Museum, School of Medicine, Cairo, Egypt.
- 200 1913. IREDALE, TOM; 39 Northcote Avenue, Ealing, W.
1888. JACKSON, Sir FREDERICK JOHN, C.B., K.C.M.G., F.L.S., F.Z.S.; Entebbe, Uganda, British East Africa; and The Red House, Aldeburgh, Suffolk.
1892. JAMES, HENRY ASHWORTH, F.Z.S.; Hurstmonceux Place, Hailsham, Sussex.
1896. JESSE, WILLIAM, B.A., F.Z.S.; Meerut College, Meerut, India.
1889. JOHNSON, FREDERICK PONSONBY, B.A., J.P., D.L.; Castlesteads, Brampton, Cumberland.
- 205 1915. JOHNSON, Sir HENRY JAMES, F.Z.S.; 55 Sloane Gardens, S.W.
1891. JOHNSTON, Sir HARRY HAMILTON, G.C.M.G., K.C.B., F.Z.S.; St. John's Priory, Poling, near Arundel, Sussex.
1905. JOHNSTONE, EDWIN JAMES, F.Z.S.; Burrswood, Groombridge, Sussex; and Junior Carlton Club, Pall Mall, S.W.

Date of
Election.

1900. JONES, Major HENRY, F.Z.S. (late 62nd Regt.); 41 Vineyard Hill Road, Wimbledon Park, S.W.
1909. JONES, Fleet-Surgeon KENNETH HURLSTONE, M.B., Ch.B., F.Z.S., R.N.; The Manor House, St. Stephen's, Canterbury, Kent.
- 210 1899. JOURDAIN, The Rev. FRANCIS CHARLES ROBERT, M.A.; Appleton Rectory, Abingdon, Berks.
1902. JOY, NORMAN HUMBERT, M.R.C.S., L.R.C.P.; Thurlestone, Bradfield, near Reading, Berks.
1880. KELHAM, Brigadier-General HENRY ROBERT, C.B. (late Highland Light Infantry); Army and Navy Club, Pall Mall, S.W.
1894. KELSALL, Lt.-Col. HARRY JOSEPH, R.A.; c/o Messrs. Cox & Co., 16 Charing Cross, S.W.
1897. KELSALL, The Rev. JOHN EDWARD, M.A.; Milton Rectory, New Milton, Hants.
- 215 1904. KELSO, JOHN EDWARD HARRY, M.D.; Braeside, Edgewood, Lower Arrow Lake, British Columbia.
1914. KENNEDY, JOHN NOBLE (R.G.A.); c/o J. G. Gordon, Esq., Corsemalzie, Whauphill, Wigtownshire; and c/o Messrs. Cox & Co., 16 Charing Cross, S.W.
1891. KERR, JOHN GRAHAM, F.R.S., F.Z.S., Regius Professor of Zoology; 9 The University, Glasgow.
1895. KINGSFORD, WILLIAM EDWARD; Cairo, Egypt.
1902. KINNEAR, NORMAN BOYD, C.M.Z.S.; Bombay Natural History Society, 6 Apollo Street, Bombay, India.
- 220 1910. KLOSS, CECIL BODEN, F.Z.S., F.R.A.I.; Assistant Director of Museums, Kuala Lumpur, Federated Malay States.
1900. KOENIG, Dr. ALEXANDER FERDINAND; Coblenzer-Strasse 164, Bonn, Germany.
1906. KOLLIBAY, PAUL; Ring 121, Neisse, Germany.
1892. LAIDLAW, THOMAS GEDDES; Bank of Scotland House, Duns, Berwickshire.
1913. LAMBERT, GODFREY CHARLES; Woodcote, Esher, Surrey.
- 225 1884. LANGTON, HERBERT; St. Moritz, 61 Dyke Road, Brighton, Sussex.
1881. LASCELLES, The Hon. GERALD WILLIAM, F.Z.S.; Tillington House, Petworth, Sussex.
1892. LA TOUCHE, JOHN DAVID DIGUES, C.M.Z.S.; c/o Custom House, Chinwangtao, North China (*via* Siberia).

Date of
Election.

1910. LEES, T. O. HASTINGS, M.A., F.Z.S.; Buckmore, Petersfield, Hants.
1898. LE SOUËF, DUDLEY, C.M.Z.S.; Director of the Zoological Gardens, Melbourne, Victoria, Australia.
- 230 1897. LILFORD, JOHN, Lord, F.Z.S.; Lilford Hall, Oundle, Northants.
1909. LINGS, GEORGE HERBERT; Richmond Hill, Cheshire.
1897. LODGE, GEORGE EDWARD, F.Z.S.; 5 The Studios, Thurloe Square, S.W.
1908. LONG, SYDNEY HERBERT, M.D., F.Z.S.; 31 Surrey Street, Norwich, Norfolk.
1904. LOWE, PERCY R., B.A., M.B., B.C.; The Nuns, Stamford, Lincs.
- 235 1914. LOWE, WILLOUGHBY PRESCOTT; Gorsemoor, Throwleigh, Okehampton, Devon.
1902. LUCAS, The Right Hon. AUBERON THOMAS, Lord, P.C., F.Z.S.; 32 Old Queen Street, W.
1904. LYNES, Captain HUBERT, R.N.; Garthmeilio, Corwen, N. Wales.
1905. MCGREGOR, PETER JAMES COLQUHOUN; c/o Dr. B. McGregor, 10 Leopold Road, Wimbledon, S.W.
1897. MCLEAN, JOHN CHAMBERS; General Post Office, Wellington, New Zealand.
- 240 1899. MACMILLAN, GEORGE AUGUSTIN, F.Z.S.; 27 Queen's Gate Gardens, S.W.
1906. MACMILLAN, WILLIAM EDWARD FRANK; 42 Onslow Square, S.W.
1909. MACNAGHTEN, NORMAN DONNELLY, F.Z.S.; Ministry of the Interior, Cairo, Egypt.
1894. MACPHERSON, ARTHUR HOLTE, F.Z.S.; 21 Campden Hill Square, Kensington, W.
1906. MAGRATH, Lt.-Col. HENRY AUGUSTUS FREDERICK (54th Sikhs); c/o Messrs. H. S. King & Co., 9 Pall Mall, S.W.
- 245 1907. MANN, THOMAS HUGH, F.Z.S.; Trulls Hatch, Rotherfield, Sussex.
1904. MAPLETON, HARVEY WILLIAM, B.A.; Weare, Axbridge, Somerset.
1894. MARSHALL, ARCHIBALD MCLEAN, F.Z.S.; Great Chitcombe, Brede, Sussex.
1894. MARSHALL, JAMES MCLEAN, F.Z.S.; Bleaton Hallet, Blairgowrie, Perthshire.

Date of
Election.

1897. MASON, COL. EDWARD SNOW ; 10 Lindum Terrace, Lincoln.
- 250 1898. MASSEY, HERBERT ; Ivy Lea, Burnage, Didsbury, Manchester.
1907. MATHEWS, GREGORY MACALISTER, F.L.S., F.R.S.E., F.Z.S. ; Foulis Court, Fair Oak, Hants.
1915. MATON, EUSTACE BERTIE ; Enford, Pewsey, Wilts.
1915. MAY, WILLIAM NORMAN, M.D. ; The White House, Sonning, Berks.
1883. MEADE-WALDO, EDMUND GUSTAVUS BLOOMFIELD, F.Z.S. ; Hever Warren, Hever, Kent.
- 255 1912. MEIKLEJOHN, Major RONALD FORBES, D.S.O. (1st Bn. Royal Warwickshire Regt.) ; 147 Victoria Street, Westminster, S.W.
1899. MEINERTZHAGEN, Major RICHARD, F.Z.S. (Royal Fusiliers) ; c/o Messrs. Cox & Co., 16 Charing Cross, S.W.
1886. MILLAIS, JOHN GUILLE, F.Z.S. ; Compton's Brow, Horsham, Sussex.
1916. MILLARD, WALTER SAMUEL, F.Z.S. ; Bombay Natural History Society, 6 Apollo Street, Bombay, India.
1903. MILLS, The Rev. HENRY HOLROYD, M.A., F.Z.S. ; The Rectory, St. Stephen-in-Brannel, Grampound Road, Cornwall.
- 260 1879. MITCHELL, FREDERICK SHAW ; Hornshaws, Millstream, B.C., Canada.
1901. MITCHELL, P. CHALMERS, M.A., D.Sc., LL.D., F.R.S., F.L.S., F.Z.S. ; Secretary to the Zoological Society of London, Regent's Park, N.W.
1914. MOULTON, JOHN CONEY, F.Z.S. ; 4th Wiltshire Regt., Delhi, India.
1912. MOURITZ, L. BERESFORD ; 2nd L.H. Regt., 1st Australian Light Horse Brigade.
1886. MUIRHEAD, GEORGE, F.R.S.E. ; Speybank, Fochabers, Morayshire.
- 265 1893. MULLENS, Major WILLIAM HERBERT, M.A., LL.M., F.Z.S. ; Westfield Place, Battle, Sussex.
1892. MUNN, PHILIP WINCHESTER, F.Z.S. ; Stourwood Cottage, Stourwood Avenue, Southbourne, Hants.
1897. MUNT, HENRY, F.Z.S. ; 10 Ashburn Place, South Kensington, S.W.
1911. MURRAY, Capt. EDWARD MACKENZIE ; Woodside, Coupar-Angus, Perthshire.

Date of
Election.

1910. MURRAY, Capt. HERBERT WILLAUME, F.Z.S.; The Old House,
Epsom, Surrey.
- 270 1900. MUSTERS, JOHN PATRECIUS CHAWORTH, D.L., J.P.; Annesley
Park, Nottingham.
1907. NEAVE, SHEFFIELD AIREY, M.A., B.Sc., F.Z.S.; 24 De Vere
Gardens, Kensington, W.
1882. NELSON, THOMAS HUDSON, J.P., M.Sc.; Seafield, Redcar,
Yorks.
1895. NESHAM, ROBERT, F.Z.S., F.E.S.; Utrecht House, Poynder's
Road, Clapham Park, S.W.
1904. NEWMAN, THOMAS HENRY, F.Z.S.; Newlands, Harrowdene
Road, Wembley, Middlesex.
- 275 1902. NICHOLS, JOHN BRUCE, F.Z.S.; Parliament Mansions, Victoria
Street, S.W.
1900. NICHOLS, WALTER BUCHANAN; Stour Lodge, Bradfield,
Manningtree, Essex.
1876. NICHOLSON, FRANCIS, F.Z.S.; Ravenscroft, Windermere,
Westmoreland.
1902. NICOLL, MICHAEL JOHN, F.Z.S.; Valhalla House, Zoological
Gardens, Giza, Egypt.
1892. OGILVIE, FERGUS MENFEITH, M.A., F.Z.S.; The Shrubbery,
72 Woodstock Road, Oxford.
- 280 1890. OGILVIE-GRANT, WILLIAM ROBERT, F.Z.S.; British Museum
(Natural History), Cromwell Road, S.W. (*Committee*).
1889. OGLE, BERTRAM SAVILE; Hill House, Steeple Aston,
Oxon.
1907. OLDHAM, CHARLES, F.Z.S.; The Bollin, Shrublands Road,
Berkhamsted, Herts.
1906. OSMASTON, BERTRAM BERESFORD (Imperial Forest Service);
Dehra Dun, India.
1913. OWEN, JOHN HUGH; Old School House, Felsted, Essex.
- 285 1883. PARKER, HENRY, C.E.; 26 St. George's Road, St. Annes-on-
the-Sea, Lancs.
1880. PARKIN, THOMAS, M.A., F.L.S., F.Z.S.; Fairseat, High
Wickham, Hastings, Sussex.
1908. PATON, EDWARD RICHMOND, F.Z.S.; Brookdale, Grassendale,
near Liverpool, Lancs.
1891. PATTERSON, ROBERT, F.L.S., M.R.I.A.; Glenbank, Holywood,
Co. Down, Ireland.
1911. PATTERSON, WILLIAM HARRY; 25 Queen's Gate Gardens,
S.W.

Date of
Election.

- 290 1904. PEARSE, THEED ; 510 Duncan Building, 119 Pender Street,
W., Vancouver, British Columbia.
1894. PEARSON, CHARLES EDWARD, F.L.S. ; Hillcrest, Lowdham,
Notts.
1902. PEASE, Sir ALFRED EDWARD, Bt., F.Z.S. ; Pinchinthorpe
House, Guisborough, Yorkshire ; and Brooks's Club,
St. James's Street, S.W.
1891. PENROSE, FRANCIS GEORGE, M.D., F.Z.S. ; Rathkeale,
51 Surrey Road, Bournemouth.
1900. PERCIVAL, ARTHUR BLAYNEY, F.Z.S. ; Game Ranger, Nairobi,
British East Africa ; Sports Club, St. James' Square, S.W.
- 295 1912. PERSHOUSE, Major STANLEY (1st Border Regt.) ; Cuil Park,
Bridge of Dee, Castle Douglas, Scotland.
1886. PHILLIPS, ETHELBERT LORT, F.Z.S. ; 79 Cadogan Square, S.W.
1893. PIGOTT, Sir THOMAS DIGBY, K.C.B. ; The Lodge, Lower
Sheringham, Norfolk.
1914. PITMAN, CHARLES ROBERT SENHOUSE (27th Punjabis) ;
Drewton, Chelston, Torquay.
1908. PLAYER, W. J. PERCY ; Wernfadog, Clydach, R.S.O., Glamor-
ganshire.
- 300 1907. POCKOCK, REGINALD INNES, F.R.S., F.L.S., F.Z.S. ; Superintendent
of the Zoological Gardens, Regent's Park, N.W.
1905. POLLARD, Lt.-Col. ARTHUR ERSKINE ST. VINCENT (The Border
Regiment) ; c/o Mrs. A. Pollard, Heatherlands, Lilliput,
Dorset.
1896. POPHAM, HUGH LEYBORNE, M.A. ; Hunstrete House, Pensford,
near Bristol, Gloucestershire.
1916. PRAED, CYRIL W. MACKWORTH (Scots Guards) ; Orierton,
Pembroke.
1898. PRICE, ATHELSTAN ELDER, F.Z.S. ; 4 Mincing Lane, E.C.
- 305 1901. PROUD, JOHN T. ; Dellwood, Bishop Auckland, Durham.
1893. PYCHAFT, WILLIAM PLANE, F.Z.S. ; British Museum (Natural
History), Cromwell Road, S.W.
1903. RALFE, PILCHER GEORGE ; The Parade, Castletown, Isle
of Man.
1903. RATCLIFF, FREDERICK ROWLINSON ; 29 Connaught Square, W.
1879. RAWSON, HERBERT EVELYN ; Comyn Hill, Ilfracombe, N.
Devon.
- 310 1894. READ, RICHARD HENRY, M.R.C.S., L.R.C.P. ; Church Street,
Hanley, Staffordshire.
1888. READ, ROBERT H. ; 8a South Parade, Bedford Park, W.

Date of
Election.

1903. RENAUT, WILLIAM E.; 34 Marylebone Road, N.W.
1908. RICHARDSON, NORMAN FREDERIC, F.R.G.S.; Lynndale, Manor Road, Forest Hill, S.E.
1907. RICHMOND, HERBERT WILLIAM, M.A., F.R.S.; King's College, Cambridge.
- 315 1895. RICKETT, CHARLES BOUGHEY, F.Z.S.; 27 Kendrick Road, Reading, Berks.
1896. RIPPON, Lt.-Col. GEORGE, F.Z.S.; United Service-Club, Pall Mall, S.W.
1907. RITCHIE, ARCHIBALD THOMAS AYRES; Magdalen College, Oxford; and Overstrand, near Cromer, Norfolk.
1902. RIVIÈRE, BERNARD BERYL, F.R.C.S.; St. Giles's Plain, Norwich, Norfolk.
1898. ROBINSON, HERBERT C., C.M.Z.S.; Selangor State Museum, Kuala Lumpur, Federated Malay States.
- 320 1912. ROBINSON, HERBERT WILLIAM, F.Z.S.Scot.; Patchetts, Caton, near Lancaster.
1896. ROGERS, Lt.-Col. JOHN MIDDLETON, D.S.O., F.Z.S. (late 1st Dragoons); Riverhill, Sevenoaks, Kent.
1913. ROGERS, REGINALD NANKIVELL; Carwinion, near Falmouth, Cornwall.
1893. ROTHSCHILD, LIONEL WALTER, Lord, D.Sc., Ph.D., F.R.S., F.Z.S.; Zoological Museum, Tring, Herts. (*Committee.*)
1894. ROTHSCHILD, The Hon. NATHANIEL CHARLES, M.A., F.Z.S.; Arundel House, Kensington Palace Gardens, W.
- 325 1907. RUSSELL, Capt. CONRAD GEORGE EDWARD, F.Z.S. (Beds. Yeomanry); 2 Audley Square, W.
1910. RUSSELL, HAROLD, F.Z.S.; 16 Beaufort Gardens, Chelsea, S.W.
1883. ST. QUINTIN, WILLIAM HERBERT, F.Z.S.; Scampston Hall, Rillington, Yorkshire.
- 1903. SANDEMAN, Lt.-Col. ROBERT PRESTON (R. Gloucester Hussars); Dan-y Parc, Crickhowell, S. Wales.
1889. SAPSWORTH, ARNOLD DUER, F.Z.S.; 30 Sussex Place, Regent's Park, N.W.
- 330 1902. SARGEAUNT, ARTHUR ST. GEORGE; Exbury, Padstow, Cornwall.
1904. SARGENT, JAMES; 76 Jermyn Street, S.W.
1914. SAUER, Dr. HANS, F.Z.S.; Bath Club, Dover Street, W.
1909. SAVAGE, The Rev. ERNEST URMSON; The Vicarage, Levens, Milnthorpe, Westmoreland.

Date of
Election.

1891. SCLATER, WILLIAM LUTLEY, M.A., F.Z.S.; 10 Sloane Court, Chelsea, S.W. (*Editor*.)
- 335 1907. SCOTT, The Rev. Canon SAMUEL GILBERT, M.A.; Belmore House, Upham, Hants.
1899. SELOUS, Capt. FREDERICK COURTENEY, F.Z.S.; Heatherside, Worplesdon, Surrey.
1908. SEPPINGS, Major JOHN WILLIAM HAMILTON, A.P.D.; Army Pay Office, Pretoria, South Africa.
1899. SERLE, The Rev. WILLIAM, M.A., B.D.; The Manse, Duddingston, Edinburgh.
1901. SETH-SMITH, DAVID, F.Z.S.; 34 Elsworthy Road, South Hampstead, N.W. (*Committee*.)
- 340 1904. SETH-SMITH, LESLIE MOFFAT, B.A., F.Z.S.; Tangley, Caterham Valley, Surrey; and Kampala, Uganda.
1909. SETON, MALCOLM COTTER CARISTON; 13 Clarendon Road, Holland Park, W.; and Union Club, Trafalgar Square, S.W.
1899. SHARMAN, FREDERIC, F.Z.S.; 47 Goldington Road, Bedford.
1865. SHEPHERD, The Rev. CHARLES WILLIAM, M.A., F.Z.S.; Trottiscliffe Rectory, Maidstone, Kent.
1908. SMALLEY, FREDERIC WILLIAM, F.Z.S.; Challan Hall, Silverdale, near Carnforth, Lancs.
- 345 1914. SMITH, Major JOHN LINDSAY (Indian Army); Supply & Transport Corps, Commdt. Camel Corps, Multan, Punjab, India.
1906. SNOUCKAERT VAN SCHAUBURG, Baron RENÉ CHARLES; Doorn, Holland.
1903. SPARROW, Lt.-Col. RICHARD, F.Z.S. (7th Dragoon Guards); Rookwoods, Sible Hedingham, Essex.
1906. STANFORD, Staff-Surgeon CHARLES EDWARD CORTIS, B.Sc., M.B., R.N.; 94 Jermyn Street, S.W.
1910. STANFORD, EDWARD FRASER; c/o Edward Stanford, Esq., 12-14 Long Acre, W.C.
- 350 1913. STANFORD, HENRY MORRANT; c/o Edward Stanford, Esq., 12-14 Long Acre, W.C.
1913. STANFORD, JOHN KEITH; c/o Edward Stanford, Esq., 12-14 Long Acre, W.C.
1915. STAPLES-BROWNE, Capt. RICHARD CHARLES, B.A., F.Z.S. (New Zealand Med. Corps); Bampton, Oxon.
1900. STARES, JOHN WILLIAM CHESTER; Portchester, Hants.
1902. STENHOUSE, JOHN HUTTON, M.B., R.N.; Craigievar, Keptie Road, Arbroath, Forfarshire.

Date of
Election.

- 355 1910. STEVENS, HERBERT; Gopaldhara, Mirik P.O., Kurseong,
Darjiling Himalayan Rly., India.
1906. STEWARD, EDWARD SIMMONS, F.R.C.S.; 30 Victoria Avenue,
Harrogate, Yorks.
1914. STEWART, JOHN; Mainshill, Beith, Ayrshire.
1914. STRESEMANN, ERWIN; Residenzstrasse 42, Dresden, Germany.
1881. STUDDY, COL. ROBERT WRIGHT (late Manchester Regiment);
Waddeton Court, Brixham, Devon.
- 360 1887. STYAN, FREDERICK WILLIAM, F.Z.S.; Stone Street, near
Sevenoaks, Kent.
1914. SUTHERLAND, LEWIS ROBERTSON, M.B., C.M., Professor of
Pathology, University of St. Andrews, N.B.; Wellgate
House, West Newport, Fifeshire.
1907. SWANN, GEOFFREY; 11 Onslow Crescent, S.W.
1905. SWANN, HAROLD, F.Z.S.; 45 Brompton Square, S.W.
1887. SWINBURNE, JOHN; Haenertsburg, Transvaal, South
Africa.
- 365 1882. SWINHOE, COL. CHARLES, M.A., F.L.S., F.Z.S.; 4 Gunterstone
Road, West Kensington, W.
1884. TAIT, WILLIAM CHASTER, C.M.Z.S.; Entre Quintas 155, Oporto,
Portugal.
1911. TALBOT-PONSONBY, CHARLES GEORGE; 5 Crown Office Row,
Temple, E.C.
1911. TATTON, REGINALD ARTHUR; Cuerden Hall, Bamber Bridge,
Preston, Lancs.
1914. TAVISTOCK, HASTINGS WILLIAM SACKVILLE, Marquis of, F.Z.S.;
Woburn Abbey, Bedfordshire.
- 370 1905. TAYLOR, LIONEL EDWARD, F.Z.S.; Bankhead, Kelowna,
British Columbia.
1886. TERRY, MAJOR HORACE A. (late Oxfordshire Light Infantry);
Compton Grange, Compton, Guildford, Surrey.
1916. THOMASSET, BERNARD CHARLES, F.Z.S.; The Manor House,
Ashmansworth, near Newbury, Berks.
1904. THOMPSON, MAJOR WILLIAM R., R.G.A.; Ravello, Carlton
Road, Weymouth.
1911. THOMSON, A. LANDSBOROUGH, M.A.; Castleton House, Old
Aberdeen, Aberdeen.
- 375 1900. THORBURN, ARCHIBALD, F.Z.S.; High Leybourne, Hascombe,
near Godalming, Surrey.

Date of
Election.

1893. THORPE, DIXON L.; Loshville, Etterby Scaur, Carlisle, Cumberland.
1903. TICEHURST, CLAUD BUCHANAN, M.A., M.D., M.R.C.S.; Grove House, Lowestoft, Suffolk.
1894. TICEHURST, NORMAN FREDERIC, M.A., M.B., F.R.C.S., F.Z.S.; 35 Pevensey Road, St. Leonards-on-Sea, Sussex.
1902. TOWNSEND, REGINALD GILLIAT, M.A.; Buckholt, West Tytherley, Salisbury, Wilts.
- 380 1914. TREVITT, CHAPLIN COURT; British Museum (Natural History), Cromwell Road, S.W.
1893. TREVOR-BATTYE, AUBYN, F.Z.S.; Ashford Chace, Petersfield, Hants; and Royal Societies Club, St. James's Street, S.W.
1913. TUCKWELL, EDWARD HENRY, F.Z.S.; Berthope, Compton, near Guildford, Surrey.
1911. TYRWHITT-DRAKE, HUGH GARRARD, F.Z.S.; Cobtree, Sandling, Maidstone, Kent.
1864. UPCHER, HENRY MORRIS, F.Z.S.; Sheringham Hall, Cromer, Norfolk.
- 385 1907. VAN OORT, DR. EDUARD DANIEL; Museum of Natural History, Leyden, Holland.
1910. VAN SOMEREN, DR. ROBERT ABRAHAM LOGAN; Jinja, Uganda, British East Africa.
1912. VAN SOMEREN, DR. VICTOR GURNET LOGAN; Uganda Medical Staff, c/o Post Office, Nairobi, British East Africa.
1908. VAUGHAN, MATTHEW; The Limes, Marlborough, Wilts.
1906. VAUGHAN, Commdr. ROBERT E., R.N.; Lough Swilly Hotel, Buncrana, Co. Donegal, Ireland.
- 390 1913. VENNING, Capt. FRANCIS ESMOND WINGATE; c/o O.C. Depot, 31st Punjabis, Rawalpindi, India.
1881. VERNER, Col. WILLIAM WILLOUGHBY COLE (late Rifle Brigade); Hartford Bridge, Winchfield, Hants; and United Service Club, S.W.
1902. WADE, EDWARD WALTER; Middelburg, North Ferriby, East Yorks.
1886. WADE-DALTON, Col. H. D.; Hauxwell Hall, Finghall, R.S.O., Yorkshire.
1916. WAIT, WALTER ERNEST (Ceylon Civil Service); Howberry, Haslemere, Surrey.

Date of
Election.

- 395 1914. WALL-ROW, JOHN ; 67 Longridge Road, Earl's Court, S.W.
 1895. WALLIS, HENRY MARRIAGE ; Ashton Lodge, Christchurch Road, Reading, Berks.
 1899. WALTON, Lt.-Col. HERBERT JAMES, M.D., F.R.C.S., C.M.Z.S., I.M.S. ; c/o Messrs. King, King & Co., P.O. Box No. 110, Bombay, India.
 1872. WARDLAW-RAMSAY, Col. ROBERT GEORGE, F.Z.S. ; Whitehill, Rosewell, Midlothian. (*President.*)
 1903. WATT, HUGH BOYD, F.Z.S. ; 12 Great James Street, Bedford Row, W.C.
- 400 1912. WELLS, CHARLES HENRY ; 6 Avondale Road, Derby.
 1912. WENNER, MAX VICTOR ; Burnside, Prestbury, near Macclesfield, Cheshire.
 1913. WHISTLER, HUGH (Indian Police) ; c/o Messrs. King, King & Co., Bombay, India.
 1891. WHITAKER, JOSEPH I. S., F.Z.S. ; Malfitano, Palermo, Sicily.
 1909. WHITE, HENRY LUKE ; Belltrees, Scone, New South Wales, Australia.
- 405 1912. WHITE, Capt. SAMUEL ALBERT ; Wetunga, Fulham, South Australia.
 1903. WHITE, STEPHEN JOSEPH, F.Z.S. ; Merok, Chiltern Road, Chesham Bois, Chesham, Bucks.
 1912. WHYMPER, SAMUEL LEIGH ; Oxford Mansions, Oxford Street, W. ; and Oriental Club, Hanover Square, W.
 1914. WICKHAM, PERCY FREDERIC ; c/o Messrs. Thos. Cook & Son, Rangoon, Burma.
 1898. WIGLESWORTH, JOSEPH, M.D., F.R.C.P. ; Springfield House, Winscombe, Somerset.
- 410 1915. WILD, OLIVER HILTON, Applegarth, Queen's Road, Cheltenham, Gloucestershire.
 1894. WILKINSON, JOHNSON ; Vermont, Huddersfield, Yorkshire.
 1912. WILKINSON, WILLIAM ARTHUR, F.Z.S. ; Dumerieff, Tudor Hill, Sutton Coldfield, Warwickshire.
 1916. WILLIAMSON, WALTER JAMES FRANKLIN (Financial Adviser to the Government of Siam) ; Bangkok, Siam.
 1897. WILSON, ALLAN READ, B.A., M.B., B.Ch. ; Eagle House, Blandford, Dorset.
- 415 1888. WILSON, CHARLES JOSEPH, F.Z.S. ; 34 York Terrace, Regent's Park, N.W.

Date of
Election.

1897. WITHERBY, HARRY FORBES, F.Z.S.; 3 Cannon Place, Hampstead, N.W.
1908. WITHERINGTON, GWYNNE; 19 Sumner Place, South Kensington, S.W.
1899. WOLLASTON, ALEXANDER FREDERICK RICHMOND, B.A.; 15 Montpelier Square, S.W.
1912. WOOD, MARTIN STANLEY, M.D.; Cheadle Royal, Cheadle, Cheshire.
- 420 1916. WOODFORD, CHARLES MORRIS, C.M.G.; The Grinstead, Cowfold, Sussex.
1912. WOODHOUSE, CECIL, M.D.; Chetnole, Sherborne, Dorset.
1902. WORKMAN, WILLIAM HUGHES; Lismore, Windsor, Belfast, Ireland.
1912. WORMALD, HUGH; Heathfield, Dereham, Norfolk.
1904. WRIGHT, WILLIAM CRAWFORD; Roslyn, Marlborough Park, N., Belfast, Ireland.
- 425 1908. WYNNE, RICHARD OWEN; Foulis Court, Fair Oak, Hants.
1895. YERBURY, Lt.-Col. JOHN WILLIAM (late R.A.), F.Z.S.; 2 Ryder Street, St. James's, S.W.; and Army and Navy Club, S.W.
1916. ZAMBRA, Rag. Cav. VITTORIO; Corso Umberto, I. 49, Rome, Italy.

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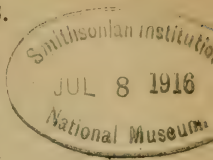
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I.—*A Revision of the Genus Haplopelia.* By DAVID
A. BANNERMAN, B.A., M.B.O.U., F.R.G.S.

WHILE engaged in working out the collections of the late Mr. Boyd Alexander, which he made in West Africa and the islands in the Gulf of Guinea, I experienced considerable difficulty in naming the specimens of the genus *Haplopelia* that he had obtained.

I found that the entire genus was in a great state of confusion, and that in several cases a single species had received two or three names, owing to the many phases of plumage through which these Pigeons pass before attaining that of the adult bird. In the following pages I have attempted to clear up some of the disputed points, but this paper must on no account be taken as a final revision of this difficult genus.

Thanks mainly to Mr. Boyd Alexander, the British Museum now possesses a very fair series of the majority of forms which have been described, and only one species (*H. hypoleuca* Salvad.) is unrepresented in the collection. Unfortunately, in one or two cases, I have been unable to

determine whether specimens (apparently quite adult) have passed into the final stage of plumage which they assume. Only more material can decide this point, and it is quite possible that my views will then have to be modified.

A key to the species is included, which, it is hoped, will be of some assistance to future workers.

In each case the type-locality is clearly stated, together with a reference to the original description.

Mr. Ogilvie-Grant has very kindly examined the entire group with me and assisted me greatly in making the key.

The geographical distribution of the genus *Haplopelia*, which is confined to the Ethiopian Region, has been worked out as carefully as possible.

The headquarters of the genus may be said to be in the Gulf of Guinea and the adjoining mainland, from which district and islands I recognize six races, not including *H. forbesi* (type-locality unknown) which most probably came from the west coast of Africa, perhaps Gaboon.

Travelling across Africa from west to east after Cameroon has been passed, we next meet with a member of the genus in Uganda, where *H. simplex jacksoni* inhabits the Ruwenzori country. In eastern Africa the genus is represented by two forms only (a third has been described from Nyasaland, but is not distinct). *H. larvata larvata* has an extensive distribution ranging from British East Africa to the Cape, and there is a small representative race, *H. l. bronzina*, inhabiting Abyssinia.

The genus *Haplopelia* (originally spelt *Aplopelia*) was created by Bonaparte in the 'Conspectus Generum Avium,' 1854, p. 66, and characterized as follows:—"Remigum secunda tertiam æquante; cauda mediocris, truncata." The type of the genus is *Haplopelia larvata* (Temm.).

In dealing with the various races of *Haplopelia*, I have come to the conclusion that they are best divided into two main sections: (A) those having chestnut under tail-coverts; (B) those without chestnut under tail-coverts, in which case these feathers are either pale cinnamon, grey, or white.

Taking the A section first, we have :

1. *Haplopetia larvata larvata*.
2. *Haplopetia larvata bronzina*.

Taking the B section, we have :

1. *Haplopetia simplex simplex*.
2. *Haplopetia simplex jacksoni*.
3. *Haplopetia simplex inornata*.
4. *Haplopetia simplex poensis*.
5. *Haplopetia simplex plumescens*.
6. *Haplopetia simplex hypoleuca*.
7. *Haplopetia forbesi*.
8. *Haplopetia principalis*.

I consider that 2, 3, 4, 5, and 6 are subspecies of No. 1 (*H. s. simplex*). As regards *Haplopetia forbesi*, it will be seen that I have here used binomial nomenclature, as I believe that it will prove to be the hen of a bird very closely allied to *H. s. simplex*, and will then become a subspecies of the St. Thomas Island form. The bird will be fully discussed in the following pages.

No. 8, *Haplopetia principalis*, I consider to be a distinct species, for reasons explained later.

Key to the Species.

A. Under tail-coverts chestnut.

a'. Wing larger, more than 140 mm. *larvata* ♂ ♀, p. 4.

b'. Wing smaller, less than 140 mm. *bronzina* ♂ ♀, p. 5.

B. Under tail-coverts not chestnut.

c'. Tips of the outer pairs of tail-feathers entirely grey on both webs.

a''. Breast dove-grey (chest sometimes washed with pinkish).

a'''. Bill larger, from feathers on forehead 15-16 mm. *simplex* ♂, p. 9.

b'''. Bill smaller, from feathers on forehead { *inornata* ♂, p. 11.

12-13.5 mm. { *poensis* ♂, p. 11.

{ *plumescens* ♂, p. 13.

{ *hypoleuca* ♂, p. 12.

b''. Breast grey washed with pinkish *jacksoni* ♂, p. 14.

I cannot uphold *H. johnstoni* of Shelley, which he described and figured in 'The Ibis' for 1893, as distinct from this form; the type was obtained by Alexander Whyte on the Milanji Plateau in the highlands of Nyasaland. I have carefully compared a series of twenty adult birds from south of the Zambesi River with nine adult examples from the type-locality of *H. johnstoni*, and the characters given by Shelley do not hold good. It may be mentioned, however, that I found eight specimens from the Chirinda Forest, together with the Nyassaland examples, to be slightly darker on the back than specimens from the country south of Rhodesia.

The specimen from British East Africa, which I refer to this species, was obtained on Mt. Kenya by Mr. H. T. Mackinder, and is now in the National Collection. It is the only specimen known from the country north of Nyasaland.

H. l. larvata belongs to the section of the genus the members of which do not appear to assume a grey plumage in the adult male, and which have chestnut under tail-coverts, the general colour of the breast being cinnamon-brown. A large series of specimens have been examined, and none shows the slightest sign of becoming grey on the breast. An immature bird which has almost assumed adult plumage still retains the barred plumage of the young on the wing-coverts.

It appears to assume the adult plumage from that of the barred young in a single moult.

***Haplopelia larvata bronzina*.**

Columba bronzina Rüpp. Neue Wirbelth. 1835, p. 65, pl. xxiii. fig. 1: Simen Province, Abyssinia.

Range. Abyssinia and Shoa.

H. l. bronzina belongs to the cinnamon-brown breasted *Haplopelias* with chestnut under tail-coverts. I can only consider this Pigeon to be a subspecies of *H. larvata*. It may, however, be readily distinguished from that bird by its much smaller size; the wing-measurement of the single

male in the British Museum is only 132 mm., while Dr. Reichenow gives 130 mm. as the wing-measurement of the specimens which have come under his notice.

SECTION B.

Such confusion has occurred with respect to the members of this section of the genus that, before dealing with the individual species and subspecies, I wish to give a short *résumé* of the chaos into which the birds from Cameroon, the islands in the Gulf of Guinea, and Uganda have fallen.

First of all, Hartlaub, in 1849, described from St. Thomas Island a Pigeon, which he named *Haplopelia simplex*, which therefore becomes the type of this group.

In 1866 Hartlaub described the bird from Prince's Island, which he named *H. principalis*.

Next, *H. inornata* was described by Dr. Reichenow from Buea, Cameroon Mt., in 1892, and from the description the type is apparently a female, brown in colour.

In 1903, Boyd Alexander discovered and described a bird from Fernando Po, also a female, with the under surface of the body rufous earth-brown, which he named *H. poensis*. Also in 1903 Count Salvadori described *H. hypoleuca*, a grey-breasted bird from Annobon.

In 1904, Dr. Sharpe obtained a young bird still retaining the rufous tips to the feathers of the mantle and wing-coverts from Efulen, Cameroon, which had been shot by Mr. G. L. Bates. This bird was beginning to assume a grey breast, and Sharpe compared it with *H. principalis*; finding it showed marked differences from the Prince's Island bird, he described it as new, notwithstanding its being a very young bird, and named it *H. plumbescens*.

In the same year (1904) an adult male grey-breasted Pigeon was obtained by Seimund in Fernando Po. Sharpe also described this bird and named it *H. seimundi*, considering it perfectly distinct from the brown bird which Alexander had obtained in this island, and had already named *H. poensis*.

Another species, apparently an adult female, was named by Salvadori *H. forbesi*, from an unknown locality (*vide* 'Ibis,' 1904, p. 368).

In the 'Bulletin of the British Ornithologists' Club,' xiv. 1904, Sharpe described yet another species, from Ruwenzori, which is named *H. jacksoni*.

Three years later, in 1907, Mr. G. L. Bates sent home a bird which he had obtained on the River Ja in southern Cameroon, close to the type-locality of *H. plumescens*. This bird, an adult grey-breasted male, proved to be identical in every way with the type of *H. seimundi*, described from Fernando Po, and, as stated by Mr. Ogilvie-Grant (Trans. Zool. Soc. xix. 1910, p. 448), it was from that moment considered that *H. plumescens* and *H. seimundi* were one and the same bird, the former name having priority.

More recently, in 1909, Dr. Reichenow described a bird with a grey breast from Bebai, southern Cameroon, which he named *Aplopelia tessmanni*. This bird has been shown by Mr. G. L. Bates ('Ibis,' 1911, p. 488) to be synonymous with *H. plumescens* Sharpe.

In the same year, 1909, Boyd Alexander was engaged in his last expedition to the islands in the Gulf of Guinea, and afterwards commenced his journey on the mainland, which unhappily ended so fatally.

I have just completed working out the bird-collections which he obtained, and, when dealing with the specimens from Cameroon Mountain, I was astonished to find that he had secured a male bird identical in every way with *H. plumescens*; but shot at the same place within a few days were three brown-coloured females from the type-locality of *H. inornata* agreeing with the description of that bird, and obviously being the females of the grey-breasted male bird which I had identified as *H. plumescens*. But, on comparing these female examples with the female of *H. plumescens*, I noticed that the under tail-coverts were cinnamon-colour, whereas in the hen of *H. plumescens* they are white!

We are therefore left with the following nine names from which to draw conclusions :—

1. *Haplopelia simplex* (Hartl.) (founded on a female).
St. Thomas Is.
2. *H. principalis* (Hartl.) (founded on a male). Prince's Is.
3. *H. inornata* Reichw. (founded on a female). Came-
roon Mt.
4. *H. hypoleuca* Salvad. (founded on an adult male).
Annobon Is.
5. *H. poensis* Alexander (founded on an adult female).
Fernando Po.
6. *H. plumescens* Sharpe (founded on a young bird).
S. Cameroon.
7. *H. seimundi* Sharpe (founded on an adult male).
Fernando Po.
8. *H. tessmanni* Reichw. (apparently founded on an adult
male). S. Cameroon,
9. *H. forbesi* Salvad. (founded on an apparently adult
female). Locality unknown,

Haplopelia simplex and *H. principalis* are both recognized as distinct species, and these names hold good,

H. forbesi must also be recognized, for reasons hereafter explained.

H. tessmanni has already been proved synonymous with *H. plumescens*, and *H. seimundi* is undoubtedly the male of *H. poensis*, the latter name having priority.

There remain *H. inornata*, *H. hypoleuca*, *H. poensis*, and *H. plumescens*.

From a close examination of these four* species, I first came to the conclusion that all were synonymous, as the cock birds from each type-locality are absolutely indistinguishable.

* I have not handled a skin of *H. s. hypoleuca*, but the description agrees exactly with males of the other three forms, all of which are represented in the British Museum Collection.

An examination of the females showed, however, that the hen bird

in *H. s. inornata* has the under tail-coverts pale cinnamon,

in *H. s. poensis* „ „ „ grey,

and in *H. s. plumescens* „ „ „ white;

while the hen of *H. s. hypoleuca* is not yet known.

I am therefore compelled, somewhat reluctantly, to keep these forms separate, and treat them as subspecies of *H. s. simplex*.

Haplopelia simplex simplex.

Turtur simplex Hartl. Rev. et Mag. Zool. 1849, p. 467 : St. Thomas Island.

Range, Restricted to St. Thomas Island, Gulf of Guinea.

In 'The Ibis,' 1915, I published a paper on the Birds of St. Thomas Island, the type-locality of *H. s. simplex*. On page 119 of that volume I wrote: "A careful examination of the series of *H. simplex* obtained in St. Thomas shows that in adult examples, *if the sexes have been correctly ascertained* by Alexander, males and females do not differ, and have the same dark brown back washed with grey and grey underparts. Younger examples of both sexes have the upperparts more umber-brown and the underparts pale brown tinged with rufous or buff."

Since I wrote this, I have examined the whole genus *Haplopelia*, and am now convinced that Alexander (or his collector) made a mistake in determining the sex of specimens Nos. 100 and 104, which he marked female, and which are in grey plumage similar to the adult male. If I am correct in this decision, then :—

The adult male has the upperparts dark bronze-brown, glossed with purple on the wings, back, and rump; the mantle is glossed with bronze-green or pinkish-amethyst, according to the reflections of the light on the feathers. The sides of the neck are strongly washed with copper-colour. The forehead is white, becoming greyer towards the crown. The general colour of the underparts is grey,

becoming whitish on the belly ; under tail-coverts grey. A very important point is that the tips of the outer tail-feathers are *grey on both webs* (specimen described, No. 98, Alexander Coll.).

The adult female has the upperparts very much *browner* and lighter, and only slightly glossed with olive on the back, rump, and wings. The mantle is similarly glossed to the male, but not quite so bright. The underparts are of a grey-brown, but the tips of the outer tail-feathers are only grey on the inner web (specimen described, No. 64 *, Alexander Coll. : breeding when shot).

The young male has the upperparts similar to the adult female just described, but the underparts are pale umber-brown tinged with rufous or buff. As the bird becomes older the belly becomes whiter, and the breast begins to lose the brown colour, and it gradually assumes the grey breast of the adult and the darker back. Again, the tips of the outer tail-feathers are grey on both webs as in the adult (specimens described, Nos. 83, 103, 101, and 55, Alexander Coll. : showing change of plumage).

A moulting bird (No. 102) shows the transition-stage between the immature and adult phase of plumage.

The young female has the upperparts lighter brown than in the adult female and immature male, and there is a distinct pinkish gloss on all the feathers. The mantle and sides of the head are strongly washed with pinkish, which in certain lights becomes pale green. The underparts are similar to those of the young male, *i. e.*, umber-brown tinged with rufous (specimen described, No. 105, Alexander Coll.).

Only one bird remains to be described, and this is in very peculiar plumage and has puzzled me much. It is No. 27 (?sex), Lake Amelia, and is obviously not fully adult, as it still retains one of the rufous-edged secondaries of the first plumage in the right wing. It is remarkable in having the grey on both webs of the outer tail-feathers shading

* In my paper on the Birds of St. Thomas, I remarked that this bird (No. 64) had not assumed the fully adult plumage which, at the time of writing, I believed to be similar to that of the adult male.

imperceptibly into the darker bases, whereas in the adult the grey is sharply defined; moreover, the whole of the chest and sides of the neck and throat up to the lower mandible are glossed with greenish. This bird, however, approaches certain other younger specimens in the collection, such as Nos. 28 and 55, killed at the same place and on about the same date. I cannot, therefore, regard it in any other light than as an abnormally coloured specimen.

***Haplopelia simplex inornata*.**

Haplopelia inornata Reichw. Journ. für Orn. 1892, p. 221 :
Buca, Cameroon.

Range. Cameroon Mt.; Efulen; River Ja; River Bumba and Bebai (Cameroon).

Specimens, subsequently obtained by Boyd Alexander from the type-locality show that the male of this species resembles the males of *H. s. poensis* and *H. s. plumbescens*, and apparently (from the description) *H. s. hypoleuca*. The females, however, which are all brown, are distinguishable by the colour of the under tail-coverts, being in *H. s. inornata* pale cinnamon, in *H. s. poensis* grey, and in *H. s. plumbescens* white; while the hen of *H. s. hypoleuca* is unknown. From *H. forbesi* the hen of *H. s. inornata* is distinguished by its less rufous and more cinnamon colouring.

A full description of the male and female obtained by Alexander is given in my paper on the Birds of Cameroon Mt. ('Ibis,' 1915, p. 483).

***Haplopelia simplex poensis*.**

Haplopelia poensis Alexander, Bull. B. O. C. xiii. 1903,
p. 33 : Fernando Po, ♀.

Haplopelia seimundi Sharpe, Bull. B. O. C. xiv. June 1904,
p. 93 : Fernando Po, ♂.

Range. Fernando Po.

When Sharpe described *H. seimundi* as distinct from *H. poensis*, it was not known that these Pigeons had a differently coloured female. I have satisfied myself, however, that this is the case, and *H. seimundi* therefore being

the male of *H. poensis* becomes synonymous with that species, the latter name having priority.

A bird obtained by Alexander on the 20th of November, 1902, and now in the British Museum, is labelled "♀," but I have no doubt that the sex in this case has been wrongly determined. It appears to be an immature male, and the brown feathers, which have not the slightest tinge of rufous as in the female, are just commencing on the breast and belly to become grey. It has the greenish gloss on the mantle characteristic of the male, whereas the female has a more pinkish gloss on the mantle.

In Alexander's paper on the Birds of Fernando Po ('Ibis,' 1903, p. 396) he includes his *Haplopelia poensis* as a synonym of *H. simplex*, having come to the conclusion that the brown female which he shot in Fernando Po and made the type of *H. poensis* is in reality the young of *H. s. simplex*. It is almost impossible to distinguish the young male of *H. s. poensis* from the hen of *H. s. simplex*. The bird which Alexander shot in Fernando Po on the 20th of November, 1902, and determined the sex to be a female, is almost certainly an immature male as I have already pointed out. Count Salvadori quite correctly recognized *H. poensis* as a distinct species in his valuable paper on the Birds of Fernando Po (Mem. Accad. Sci. Torino, 1903, p. 121), and gives his reasons, which are very sound, for refusing to unite *H. s. poensis* with *H. s. simplex* in 'The Ibis,' 1904, p. 369.

Count Salvadori was perfectly right in keeping as distinct races *H. s. simplex*, *H. s. poensis*, and *H. principalis*, so that I have no doubt the new form which he has described from Annobon will prove to be valid.

Haplopelia simplex hypoleuca.

Haplopelia hypoleuca Salvadori, Mem. Accad. Sci. Torino, 1903 (Orn. Golfo d. Guinea, iii. p. 93) : Annobon.

Range. Restricted to Annobon.

H. s. hypoleuca was described by Count Salvadori from a perfectly adult male specimen obtained in the island of Annobon by Signor Fea on the 14th of April. I have been

unable to examine this Pigeon personally, but Count Salvadori describes it so minutely that I have been able to place it exactly, and include it in my key to the species. The following is a translation of Count Salvadori's latin description:—

♂ *ad.* Forehead white, gradually shading into grey on the occiput; hind-neck and interscapular region grey; the margins of many of the feathers green or shining amethystine. Back, rump, wing-coverts, and middle upper tail-coverts brownish-grey. Throat white, forepart and sides of the neck becoming green when held in certain lights. Middle of the belly and under tail-coverts white; sides of the body grey. Greater wing-coverts, lateral upper tail-coverts, and middle pair of tail-feathers lead-colour; remaining tail-feathers greenish-plumbeous above, pale grey towards the tip. Underside of the tail black, with a broad apical band of whitish-grey. Remiges brownish-grey; under wing-coverts plumbeous. Bill black.

Total length about 290 mm.; wing 150; tail 92; culmen 12; tarsus 30.

The above description applies equally well to the male bird of *H. s. inornata*, *H. s. plumescens*, or *H. s. poensis*! As, however, these races differ only very slightly in the females, I have upheld the name proposed for the Annobon bird. It may well prove to have a female showing differences from the three forms mentioned above, and, being isolated, is all the more likely to be distinct. It must be a very rare bird on Annobon, as Boyd Alexander did not secure a single specimen during his last visit to the island.

Could it have been a chance wanderer from the mainland? As it is known to the natives by the name of "Lola Sän-Sän," this is not very probable. Fea, however, says it is extremely rare.

Haplopelia simplex plumescens.

Haplopelia plumescens Sharpe, Ibis, 1904, p. 95: Efulen, southern Cameroon.

Aplopelia tessmanni Reichw. Ornith. Monatsber. xvii. 1909, p. 87: Bebai, southern Cameroon.

Range. Southern Cameroon (excluding Cameroon Mt.), River Ja District.

Sharpe described *H. s. plumescens* from a very young male bird, which Mr. G. L. Bates had procured at Efulen on the 21st of January, 1902. In his original description he compared it with *H. principalis*, but it is in reality much more closely allied to *H. s. simplex*. Five years after the type had been procured, Mr. Bates procured a second specimen from the River Ja, and in 1910 three more examples—an adult male and female and a young male. Upon receiving the first adult male it was discovered that it in no way differed from the type of *H. seimundi* Sharpe (which I have shown to be synonymous with *H. poensis*); and this was pointed out by Mr. W. R. Ogilvie-Grant (Trans. Zool. Soc. xix. 1910, p. 448), and later by Bates himself ('Ibis,' 1911, p. 488), where he notes that his *H. plumescens* is synonymous with *H. tessmanni* Reichw.

Mr. Ogilvie-Grant and Mr. Bates were certainly correct when they pointed out that the males of *H. seimundi* and *H. poensis* were indistinguishable, but the female, which had never been compared, proves that *H. s. plumescens* and *H. s. poensis* are distinct races, hens of *H. s. plumescens* having white under tail-coverts, *H. s. poensis* grey. Mr. G. L. Bates made the valuable discovery that the grey males have a brown female. He also gives a description of the nest in his interesting paper.

***Haplopelia simplex jacksoni*.**

Haplopelia jacksoni Sharpe, Bull. B. O. C. xiv. 1904, p. 93 : Ruwenzori.

Range. Ruwenzori, Uganda.

The type of this species is an immature bird, as has already been pointed out by Mr. Ogilvie-Grant in the Report on the Ruwenzori Collection (Trans. Zool. Soc. xix., 1910, p. 447).

Two adult males were obtained by the Ruwenzori Expedition, and show that the bird is very closely allied to *H. s. simplex*—in fact, it is often difficult to name individual birds of either race from colour alone. When a series is

examined, it will be seen that *H. s. jacksoni* has the underparts suffused with a pinkish wash, while in *H. s. simplex* the underparts are grey, only faintly washed in some cases with pinkish. The best distinction is undoubtedly to be found in the bill, which is much shorter in *H. s. jacksoni* than in the typical form. The bill in the adult specimens of *H. s. jacksoni* measures 13 mm., while in *H. s. simplex* it varies from 15–16 mm. in adult male birds.

Mr. Ogilvie-Grant has already published a description of the female and young of this species and of a bird in intermediate plumage which were procured by the Ruwenzori collectors, from which I quote the following :—"The adult female has the upperparts earth-brown, shading into bronzy-rufous on the upper mantle, nape, and occiput, and there is no trace of the grey, violet- or green-glossed mantle which characterises the male; the entire underparts below the neck as well as the under tail-coverts are rich vinous."

The immature male has the upperparts similar to the adult male, save that the wings are glossed with pinkish-purple instead of with golden-olive, while the underparts are rich vinous like the adult female.

***Haplopelia forbesi*.**

Haplopelia forbesi Salvadori, Ibis, 1904, p. 368.

Range and Type-locality. Unknown.

Count Salvadori has already given a long history of this Pigeon in 'The Ibis,' where he includes a detailed latin description of the bird, which he names *H. forbesi*.

This Pigeon appears to have been first mentioned in the 'Catalogue of the Pigeons in the Derby Museum,' where it was referred to as *H. principalis* Hartl., and said to have been obtained in Cayenne! Count Salvadori, having examined the bird, pronounced it to be an undescribed species, probably from West Africa.

The bird, which is almost certainly a female, although the sex was not ascertained by the collector, is remarkable in having the under tail-coverts *white*, thereby differing from the hens of the other known species of *Haplopelia*.

The type is in the Liverpool Museum.

There is a specimen in the British Museum from "West Africa," which, as is stated on the label, has been compared with the type. This example is rather lighter rufous in colouring than the hens of the other nearly allied forms which I have examined, and it certainly possesses pure white under tail-coverts.

As the type-specimen and the bird in the British Museum so closely resemble the hen of *H. s. poensis*, I have little doubt that the male bird (when discovered) will prove to be very closely allied to it, and *H. forbesi* will then rank as a subspecies of *H. simplex*.

For the present I prefer to keep it separate.

Haplopelia principalis.

Peristera principalis Hartl. Proc. Zool. Soc. 1866, p. 330 : Prince's Island.

In my paper on the Birds of Prince's Island I have already pointed out ('Ibis,' 1914, p. 630) that *H. principalis* cannot possibly be confused with *H. s. simplex*, as has been done by Dr. Reichenow. In fact, it is so much more differentiated from the typical form than either *H. s. poensis*, *H. s. inornata*, *H. s. plumbescens*, *H. s. hypoleuca*, or even *H. s. jacksoni*, that I have here kept it as a distinct species.

From these five races the adult males may be distinguished at a glance by their *pinkish* underparts, while in *H. s. simplex* and the subspecies mentioned above the general tone of the under surface is dove-grey. The hens are not so distinct, but, nevertheless, can be easily differentiated.

It may be that I shall be criticised for considering *H. principalis* from Prince's Island a species, when I unite birds on the mainland and in the other two islands (Fernando Po and Annobon) with *H. s. simplex*—the St. Thomas Pigeon. I have done so, however, as *H. principalis* shows a perfectly distinct scheme of colouring in being pink instead of grey, and shows therefore that it has probably been isolated for a considerably longer period than any of the other island-forms with which we are dealing. It can no longer be united with the grey-breasted birds, and must stand as a separate, well-differentiated race.

II.—Notes on some of the Birds of Grand Cayman,
West Indies. By T. M. SAVAGE ENGLISH.

(Plate I.)

AN account of the birds of the Cayman Islands was given by Mr. P. R. Lowe in 'The Ibis' (1911, pp. 137-161), his list comprising 75 species. To this number the present writer during a residence of three years, one of them in the south-west and the other two in the north of Grand Cayman, the largest and most westerly island of the group, has been able to add 12, of which 4 (or 5) are resident and 2 (or 3) summer visitors breeding in the island.

These new birds are :—

<i>Sterna antillarum.</i>	<i>Pelecanus fuscus.</i>
<i>Catotrophorus semipalmatus.</i>	<i>Pandion haliaëtus.</i>
<i>Himantopus mexicanus.</i>	<i>Strix flammea.</i>
<i>Fulica americana.</i>	<i>Chordeiles virginianus.</i>
<i>Nomonyx dominicus.</i>	<i>Chordeiles minor.</i>
<i>Dendrocyena arborea.</i>	<i>Cotyle riparia.</i>

Against these additions to the Cayman avifauna a familiar acquaintance with two species, in the north of the island, where they are perhaps as common as Jays are in the woods of the south of England, would tend to cast some doubt on their right to specific rank.

These two are—*Amazona caymanensis* and *Icterus bairdi*.

The Parrot *Amazona caymanensis* seems to be smaller than the Cuban bird, as might perhaps be expected in the case of a race inhabiting a small island (cf. *Vanessa urticae* from the Isle of Man, Shetland ponies, &c.), but as regards colour, its variability is quite sufficient to enable a number kept in captivity to be easily distinguished individually by their colouring—in most cases by the colouring of their foreheads. Those with white foreheads are supposed by the islanders to be hen birds and useless as talkers, those which have brightly coloured foreheads being males and capable of learning. This was certainly the case with the parrots kept by the

writer—while they were in their native land. Two of these (males of 1911 and 1912) are at present (September 1915) at the Zoological Gardens, London, and since their departure from Cayman, whether it be owing to change of climate or of food, or to other circumstances unknown, they have changed in colour from a bright, almost golden green to quite a dark and far duller hue, while their foreheads have lost almost all their yellow feathers and most of their red ones and have become more or less white. This dull green plumage is a reversion to their immature condition, but at that time they have not developed much colouring other than green on their foreheads.

Icterus bairdi, one of the Troupials, is by no means uncommon in the north of Grand Cayman and is usually seen in small parties of five or six birds, hunting for food in the crowns of Cocoanut and *Thrinax* palm trees. These parties are presumably families, for, though three years was not long enough to enable the writer to find a nest, there can be but little doubt as to this bird's breeding somewhere on the island, and as a rule various hues, ranging from bright golden yellow (? *Icterus bairdi*) to dull olive (? *Icterus leucopteryx*), are represented in any one of them. It was in this same island of Grand Cayman that a married couple, having described themselves as "coloured" at the 1911 census, put down their offspring as "white" and "black," presumably according as they were fairer or darker than themselves.

The four resident birds which are not on Mr. Lowe's list are:—

Catotrophorus semipalmatus.

Dendrocycna arborea.

Nomonyx dominicus.

Strix flammea.

Himantopus mexicanus may possibly be resident, while *Sterna antillarum* and *Chordeiles virginianus* are summer visitors breeding in the island.

Catotrophorus semipalmatus is a fairly common resident in the north of Grand Cayman and breeds there. The islanders call it "Laughing Jackass," and the reason for the name is apparent during the breeding-season, when the noise it makes

is deafening as it flies round an intruder on its domain, occasionally settling for a short time on a bare limb of some small tree or on the ground, but hardly ceasing its harsh double note until the unwelcome visitor is out of sight.

A nest of this bird came under observation in June 1913; it was on a dry sandbank, scantily covered by grass and other low-growing maritime vegetation, which was largely occupied by a colony of *Sterna antillarum*. The nest was merely a slight depression in the sand partly shaded by a small plant of Sea-Rocket (*Cakile maritima*); it contained four eggs of somewhat "plover" type and arranged in the nest after the manner of these birds, their colour being very like that of the eggs of the Lesser Blackbacked Gull and their size 2.12×1.3 inches. When first found, the sitting bird was pressed closely to the ground with her neck and head stretched out, and was at first taken to be a dead fish. She allowed herself to be touched without moving, and was left sitting on the 15th of June. On the 22nd the first egg had evidently just hatched, and on this occasion the parent birds were exceedingly noisy.

The young one, except for the length of the beak, might have been a young Herring-Gull. Its feet were slightly webbed, and it gave no sign of being able to use them, lying quite passively even when handled. On the 25th of June there was no sign of old birds or young except two addled eggs.

Nomonyx dominicus seems to be more or less abundant throughout the year, on the secluded ponds of salt water which are frequent among the tall Black Mangrove (*Avicennia*) woods in the north of Grand Cayman; it most probably breeds somewhere near them—very possibly among the dense thickets of Red Mangrove (*Rhizophora*), by which they are mostly surrounded. Anyone who has ever been among Red Mangroves will appreciate the difficulty of finding the nest of a diving bird among them—except by a fortunate chance which never came to the writer.

Most of the resident birds of Grand Cayman are remarkably fearless of man, very much as robins are in

Europe, but these ducks are more wary, and when their pond is approached generally make their first appearance in the middle of it, having dived at the sight or sound of the intruder and, if near the shore, found their way under water to what they think is a safer place. When at rest they float very much as most waterfowl do, the water-line being in about its usual place, but when swimming they are almost always deeply submerged, and if approaching or receding from the observer, seem to have a relatively enormous "beam." Of course this effect may be only due to the very low elevation of the bird's back above the water. Their method of diving is interesting. It has the appearance of being done without the movement of a muscle, just as if the bird were a leaking vessel which was going down on an even keel. This downward progress is often interrupted, when just the head, the neck, and the upper part of the upstanding tail are showing above the surface, or a little later, when only the head and part of the neck, which is habitually kept stiffly upright (as is the tail), are visible. In either of these positions the bird seems able to rest as well as to swim at some speed.

Nomonyx dominicus has at least two calls, one of them very like the clucking of a hen to her chickens, and the other more reminiscent of a short note from a motor-horn.

Dendrocynna arborea is by no means uncommon, and breeds in various parts of the south and south-west of Grand Cayman, but apparently not in the north, though it occurs there not infrequently. Its nest and eggs are described as being "exactly like a hen's," the nest, such as it is, being made mostly of grass and similar material and apparently not lined with down. It seems to be as a rule well hidden in some dry place among bushes. The ducklings in colour and general appearance are very like those of the darker type of the domestic duck.

This bird is readily tamed. Shortly before leaving the island, the writer tried to give their liberty to two which had been brought up from the duckling stage, but after having been at large for several weeks they flew back to

their accustomed quarters, waited about, calling vigorously, until they were let in, and could not be induced to leave the regular supply of food a second time.

Despite its small size, this duck will do its best to take entire charge of a poultry-yard, waking up indignantly to join in any dispute among the fowls. It sleeps as a rule through the day, and at night is more to be relied on as a "watch" than most dogs.

In its wild state it goes to its feeding grounds at dusk, giving its whistling call as it flies, and seems to wander a good deal during the night, as it by no means infrequently alights, at all sorts of hours and often with a resounding noise, on one of the galvanized iron roofs usual in Cayman, evidently mistaking it for water.

It seems to be mainly vegetarian, though it is very fond of tadpoles and similar soft animal food. Anything at all hard is invariably dipped into water and well bruised and pounded before being eaten.

Strix flammea which, with the exception of the Osprey, is the only bird of prey living in or regularly visiting Grand Cayman, is decidedly one of the rarer birds of the island. The writer only knows of the existence of two pairs, one of which (and probably the other as well) breeds in a hollow tree, and he has only heard of one other, though rats (*Mus alexandrinus*) and mice (*Mus musculus*) abound. These were in all probability first imported at least as long ago as the settlement of the island in the early part of the 18th century, and the rats at all events are quite at home in its wildest parts, but by reason of the land-crabs, they seem to have almost lost the art of burrowing and spend most of their lives in the trees—a state of things which presumably does not suit *Strix flammea*.

Himantopus mexicanus is said to be a resident, but the writer personally has only seen it in the summer and never succeeded in finding its nest. It probably breeds in suitable places all over the island, and certainly does so in the southwest, where *Dendrocycna arborea* also seems to have its headquarters and where, except after very prolonged dry

weather, fresh-water ponds are to be found, where, too, the large land-crabs are least abundant. In Grand Cayman this bird nests in May, and in the later summer months seems to wander about the island in family-parties.

Sterna antillarum does not seem to come to Grand Cayman except for the purpose of breeding, and then is only present in comparatively small numbers—about 150 birds and fewer than 40 nests with eggs or young was the maximum at any one time in the only colony of which the writer has knowledge, and there were very seldom so many as this. The islanders call them “egg-birds,” and the name perhaps gives one of the reasons why there are not more of them. June seems to be their usual month for nesting, but in 1913 a succession of misfortunes, due to cats (*Felis domestica* run wild) and land-crabs, ended early in August in an abnormally high tide washing away all the surviving eggs and all the young ones except eight, which were accounted for by a cat the following night. Some of the old birds stayed about until the middle of the month, but did not try to nest again. This may have been the end of the colony, particularly as their sandbank was showing signs of being rapidly washed away.

This bird's nests are sometimes more or less made of dry seaweed and similar material, but usually they are nothing more than shallow pits scratched in the sand just before the laying of the first egg, which sometimes can be seen lying on sand which is still moist, though the surface of the sand surrounding the nest may be perfectly dry.

Only two eggs seem to be laid, in size $1\frac{1}{4} \times \frac{3}{4}$ inches, and in ground-colour varying from light yellowish-brown or grey to nearly white. Their spots are often arranged spirally and are usually dark brown or chestnut, while they vary considerably in size and number. One type of egg has a nearly white ground-colour with a few—perhaps two or three, perhaps only one—large, very dark brown, almost black, irregular blotches, and unspotted eggs occur.

The downy young are as a rule of various shades of light grey above, with numerous small dark, though not very

clearly defined spots, and white beneath. Another type is of various shades of yellowish-grey and is unspotted, but, having only been noticed in the nest, this may perhaps be the first stage after hatching, and may develop spots later. Their beaks are horn-coloured with dark tips, and their feet and legs are pink. They have a most remarkable resemblance to the pebbles of weathered coral which abound on every West Indian beach.

Chordeiles virginianus is a very abundant spring and autumn migrant, some staying throughout the summer and breeding along the western shore of the island, while an occasional individual may be found during the winter months. Quite possibly this bird breeds in other parts of Grand Cayman than the west, but it does not seem to do so in the north, and this is very probably due to the abundance there of the large land-crab (*Cardisoma guanhumu*), which is at least as deadly an enemy to any bird nesting on or near the ground, as the imported mongoose has been found to be in Jamaica. The place where they undoubtedly do breed is a flat but rugged expanse of coral-rock, nearly bare of vegetation, and about six to ten feet above sea-level, stretching for some miles south from Georgetown, the largest settlement in the Cayman Islands, between the sea and a road along which there are houses and cultivation—consequently very few crabs. Walking over this rock, one frequently puts up “nighthawks,” and on the 30th of May, 1911, one of these left a lately hatched young one. No sign could be found of another young one or egg.

The other five additions to Grand Cayman's birds do not appear to breed there. They are :—

Fulica americana.

Chordeiles minor.

Pelecanus fuscus.

Cotyle riparia.

Pandion haliaëtus.

Fulica americana is frequent enough to be known to the islanders as the “Diving Widgeon” (the Cayman “Coot” is *Gallinula galeata*), but was only seen twice by the writer—in November and December, 1913; and on both occasions as

a corpse thrown up on the beach after heavy weather from the north-east. It is just possible that this bird may be a resident in other parts of Grand Cayman than the north.

Pelecanus fuscus appears occasionally at almost any season of the year, but does not ever seem to stay for more than a day or two.

Pandion haliaëtus is represented in Grand Cayman by a very small number of individuals, though at least one pair of them seem to be regular winter visitors, arriving in September and leaving in March.

Chordeiles minor was only seen on one occasion. This was during the evening of the 16th of May, 1911, when seven or eight of them, noticeable by reason of their size, were flying about in company with a number of the larger *Chordeiles virginianus*.

Cotyle riparia is likely to be only a casual visitor. Two of them were flying about over water during the morning of the 26th of March, 1912.

In addition to the twelve species already mentioned not previously recorded from Grand Cayman, I noticed on the 22nd of March, 1912, just after sunset a large bird, which, in any part of tropical America known to be inhabited by it would, without hesitation, have been taken to be *Cathartes aura*, circling overhead at a great height, and as the islanders say that "John Crows" occasionally appear over the island, this bird may have some claim to a place in the Cayman avifauna.

In November 1912, during and after some heavy weather, a large dark-coloured Tern was to be seen, which may or may not have been *Sterna fuliginosa*; and on the 1st of May, 1913, a flock of six birds about the size of Starlings was observed flying from tree to tree, of which four had stout dark beaks, dark grey or black rather variegated backs, conspicuous straw-coloured napes, and were black underneath, while the other two resembled the female house-sparrow in colour. From this description Mr. Lowe identifies these as *Dolichonyx oryzivora*. They were only seen on this one occasion.

The identification of the foregoing birds is of course

doubtful, but this does not apply to *Phaëton flavirostris*, which is a common enough sight during most voyages over the seas surrounding Grand Cayman and the Lesser Caymans, 60 miles to the north-east, so that it might fairly be included among the birds of the Cayman Islands. It does not, however, seem to show itself very near the land.

Mr. Lowe is quite correct in his conjecture that *Hirundo erythrogaster* is only a spring and autumn bird-of-passage in the Caymans. Particularly in autumn it is sometimes present in hundreds, but seems to take only a few days' rest before going on. One of these Swallows roosted over the door of the writer's house on the 12th, 13th, and 14th of October, 1912, and these three nights may perhaps have been the time of its stay in the island.

Swallows were present, in 1911, between the 19th of April and the 20th of May, and between the 17th of August and the 19th of October; in 1912, between the 11th of April and the 11th of May, and between the 25th of August and the 20th of October; in 1913, between the 11th of April and the 13th of May, and between the 6th of September and the 11th of October. At times, stray individuals appear during both the summer and winter months, but no attempt at nesting ever seems to be made.

Among the birds peculiar to the island whose nests are unknown to the writer, are *Mimocichla ravid*a and *Holoquistus caymanensis*.

*Mimocichla ravid*a is one of the rarest, or at all events most elusive, of the birds of Grand Cayman, and escaped the writer's notice during more than two years spent among its supposed haunts. More than this, it seems to be unknown to the islanders.

In this connection a word of warning to any ornithologist, who may think of going out to these or to similar islands, may not be out of place. The Cayman islanders, those of them, that is to say, who have escaped the worst effects of a school education according to Government pattern, have a very thorough knowledge of the living things of the "bush" and, with reason, pride themselves on this knowledge; also

(with the same reservation) they are good to the stranger within their gates. So, if a stranger asks questions about any creature supposed to inhabit the island, the person questioned is very apt to take it for granted that he must know more about it than his questioner does; while his sense of hospitality forbids a bald statement of ignorance. The result, though quite probably given in perfect good faith, may be worthy of an eastern dealer in "antiques."

It was on the 21st of January, 1914, that *Mimocichla* was seen at last, during the making of a new road through such a tangle of knife-edged coral-rock, swamp, and mangroves, with patches here and there of the poisonous manchineel tree and of climbing cactus, that at first it took more than two hours to cover a distance easily walked over in five minutes when the road was made. And it was in all probability the same individual which appeared at the same place on the 27th of January and the 10th of February, and on these occasions only, though the bird and its possible nest were looked for every day.

On its first appearance it stayed in full sight for some five to ten minutes in a tall mangrove bush close to the new clearing, and was singing. Its song was very subdued, recalling the warble of a Budgerigar. Its manners and general appearance, apart from its colour, were not unlike those of a blackbird, and the second time it showed itself it flew across the road, giving a "thrush" chatter as it flew. This, like its song, was only just audible. The last time it was seen, it was in the same bush as a Tyrant Flycatcher, which, as usual, was deeply interested in the work just being commenced on the road, and flew up to get a closer view. *Mimocichla*, on the contrary, dived at once into the depths of the mangroves and was seen no more. It obviously liked human society less the more it saw of it.

Holoquiscalus caymanensis differs from the bird last mentioned in being one of the few wild creatures which seem to be absolutely without any fear of man, and can be fairly described as being aggressively friendly. It is

common all over Grand Cayman, particularly among or near mangroves, where it has a way of proclaiming its presence by the curious ringing cry from which it gets its local name "Ching ching," and by coming nearer and nearer to the observer until it is on a branch close to his head, on the ground at his feet, or by no means infrequently on his outstretched foot if he is sitting still. From this point of vantage it repeats its cry two or three times as a sort of greeting, and then goes about its business.

It is a decidedly better "mocking bird" than *Mimus orpheus*, and can give a most realistic imitation of a frog (*Hyla septentrionalis*) caught by a snake, or perhaps by the bird itself, seeing that it is very fond of frogs as food, though it seems to be practically omnivorous.

During the winter months it flocks in large numbers, flying from place to place before roosting, just as the Common Starling does. This seems always to be among the mangrove woods, and it is said to nest in colonies in the most inaccessible parts of these, making an open nest of sticks and laying bluish eggs.

As well as those of *Catotrophorus semipalmatus* and *Sterna antillarum*, already mentioned, the writer has had under observation nests of the following Grand Cayman birds :—

Colaptes gundlachi.

Melopyrrha taylori.

Mimus orpheus.

Euethia olivacea.

Vireosylva caymanensis.

Spindalis salvini.

Dendræca petechia auricapilla.

Cæreba sharpii.

Dendræca vitellina.

Colaptes gundlachi is one of the common birds of the island, and, as Mr. Lowe has observed ('Ibis,' 1911, p. 150), is very tame. There cannot be many places in which it is possible to watch a Woodpecker feeding within three feet of the observer, as unconcernedly as if it were a canary in a cage. Its breeding-season is July to August, and a very favourite site for its nest is the stem of a dead Thatch-palm (*Thrinax argentea*). The uppermost two or three feet of one of these, generally about five or six inches in diameter

and ten to twenty feet from the ground, decays rapidly inside, so that it becomes just a hard outer shell perhaps half an inch thick, enclosing what is little more than powder held together by a loose network of fibres and capped by the more lasting remains of the "crown" of the palm—an ideal situation for a woodpecker's nest, but impossible to examine except after complete destruction. The same hole seems to be used year after year if the palm-stem lasts, and in early August the young can generally be seen blocking the entrance with their heads, and heard, often with not more than two minutes' intervals, loudly welcoming the return of a parent with food.

Mimus orpheus in Grand Cayman builds an open nest of small sticks rather roughly put together and lined with grass, palm-fibre, and similar material, in a bush or tree at any height from about three to twenty or more feet above the ground. Three eggs are usually laid, and there can be little doubt that the heat of the sun assists in their hatching, seeing that during sunny weather the bird does not seem to sit regularly, if at all, and that the young more often than not seem to be hatched at intervals of a day, just as the eggs were laid. The period of incubation is eleven to twelve days, and the usual nesting season is from January to June, though the majority of nests seem to be made in April. *Mimus orpheus* will not allow any large bird to come within range of its nest unchallenged. One nesting near the beach would attack any Frigate-bird flying at all low overhead, and keep up the chase until well out to sea. This bird is locally called "Nightingale," and does occasionally sing at night, but most of the local accounts of the nocturnal music of "Nightingales" seem to have originated in the books (from England), by means of which the Cayman school-children are taught to read. Its song is very like that of *Turdus musicus*.

Vireosylva caymanensis is frequent in the "bush," and is very probably the real singer of the song attributed to *Melopyrrha taylori*. The two birds are often noticed not far apart. A nest was found, on the 27th of May, 1913,

suspended from a small branch about three feet from the ground. It was compactly woven of spider's web, palm-fibre, and similar material, the outside being finished off with some pieces of bark covered with lichen, and the remarkably deep cup being lined with fibre. The nest ended below in a point, recalling, though in a less pronounced manner, the pointed end of the Australian Fantail's nest. When found, the bird was sitting, though the two eggs were evidently lately laid. They were pink in colour, with very small round dark claret-coloured spots mostly around the large end. One egg was only slightly spotted. Both birds stayed close to the nest while it was being examined, flying from branch to branch. The one which had been sitting had a harsh scolding note, like a Whitethroat's; the other was silent. On the 8th of June the bird was still sitting, and was not disturbed. Presumably because of the depth of the nest, it was in a most constrained position, with its beak pointing vertically upwards. On the 12th of June there were young ones in the nest, which had the appearance of having been hatched about two days. They had greyish down, and the inside of their throats was yellow.

This was the only nest, old or new, of *Vireosylva caymanensis* found by the writer; it would seem that it cannot breed very freely in the north of Grand Cayman, which has such a comparatively dry climate, that nests often remain for years after they have been abandoned, without much alteration in appearance.

Dendroica petechia auricapilla seems to breed much more commonly in this district than the last-mentioned bird, and its old nests are by no means infrequent in the "bush." It is locally known as the "Yellow bird." A newly built nest, found on the 20th of April, 1913, was made of dry "turtle grass" (*Thalassia*) and spider's web not very neatly put together, though the palm-fibre lining of the cup was well finished; it was in a bush of "button-wood" (*Conocarpus*) about five feet from the ground. Though there were no eggs until about ten days later, the birds

were very excited when the nest was approached. On the 4th of May there were two eggs which were still quite fresh. They were smaller than would have been expected from the size of the bird, and like heavily marked Greenfinch's eggs in colour. This nest, together with most of the nests made of "turtle grass" which are presumably those of this species, was in a locality several miles from any fresh water, even the dew being more or less briny, except when heavy rain has thoroughly washed the leaves and so removed the salt which the trade-wind brings in fine spray from the reef. So it is difficult to avoid the conclusion that this *Dendræca* must be able to satisfy its thirst from the sea, like *Fregata aquila*, which can often be seen, when the sea is smooth, drinking on the wing as a swallow does.

Dendræca vitellina nested in the writer's garden (at Georgetown) in April and May, 1912. The first nest was about four feet from the ground in a *Ficus benjamina*, and was beautifully made of cotton-wool (*Gossypium*) from a bush growing close by, with a lining of feathers. When first found, on the 11th of April, it was apparently quite finished, but the bird continued to add feathers to the lining until the 20th or 21st, on which day the feather bed was level with the rim of the nest.

The first egg was laid at about 8 A.M. on the 22nd, and the second before 7 A.M. on the following day. They were large for the size of the bird, and in colour not unlike the grey-green type of the Red-backed Shrike's egg. On the 5th of May some enemy broke one of the eggs, and though the bird did not desert the survivor and hatched it on the following day, the young one, too, was taken on the 7th. Another nest, also made of cotton, was begun on the 8th of May in a low croton-bush less than two feet from the ground, but was not finished; and a third, not quite so full of feathers as the first, but otherwise like it, was found on the 11th about eight feet up in an orange-tree. On the 17th this nest had two eggs in it which differed somewhat in colour from those previously found. These had no suggestion of green in either ground-colour or markings,

the former being greyish-white, while the spots were grey and brown. As is the case with *Mimus orpheus*, and, it would seem, with other builders of open nests in Grand Cayman, this bird did not sit at all regularly during the hottest part of the day, until incubation was well advanced. The eggs were hatched on the 29th, but again the young ones disappeared when they were only a few days old.

Melopyrrha taylori is by no means a rare bird in the north of the island, where it is known as the "Black Sparrow" and has the reputation of being a songster, though whether it really sings the song attributed to it seems a little doubtful. As might be expected from its powerful beak, its food seems to consist largely of hard seeds, including those of *Thrinax argentea*, the "Thatch palm" of Grand Cayman, which are of a hardness almost stony. Its abandoned nests are not uncommon, but the writer never managed to see its eggs. They are said to be "like a Yellow bird's (*Dendroica petechia auricapilla*), but with very dark spots."

The nest is a covered one, rather large, and roughly made of fibre and grass, with an entrance high up at one end. Outwardly it is not unlike the nest of a branch-building House-Sparrow in appearance, but it has no lining. One of these nests, just built, was found on the 29th of December, 1912, about twelve feet from the ground in a slender bush. It was difficult to get at without damage being done which might make the birds desert it, but, as a road was near, this was not impossible, and it was examined on the 2nd, 9th, and 23rd of January, and was found to be empty on each occasion, though the birds were about, as they were on the 7th of February. Three months later, on the 16th of May, they were found to be feeding a brood of young ones, and on the 22nd these had flown.

Euethia olivacea seems to wander about Grand Cayman in small parties, staying for a few days wherever there happens to be grass with ripe seeds. A nest of this bird containing three eggs was found on the 18th of June, 1912, about a foot from the ground in a low bush. The nest was

domed, with the entrance at one side, and was lightly built of grass and fibre without any particular lining. The eggs were white with claret-brown spots and markings, mostly around the large end. They were hatched on the 26th, and had probably been incubated for some days when first found. This nest, until the bird was seen, was thought to belong to *Cœreba sharpii*, the eggs being almost identical with one type of that bird's; but the position of the nest so near the ground seemed unusual, and it was much less substantially built than the nest of *Cœreba sharpii* usually is.

Spindalis salvini is perhaps as common in the north of Grand Cayman as the Bullfinch is in southern England, and its abandoned nests, lightly built of palm-fibre and looking very like those of the Whitethroat, are frequently to be seen in the "bush."

Mr. Lowe, in his paper on "Birds collected during a Cruise in the Caribbean Sea" ('Ibis,' 1909, p. 346), states that the female of this species is undescribed. The plumage has none of the bright colouring of the male, being, except for the usual light and dark shading of the wing- and tail-feathers, and for a light streak over the eye, as uniformly brown as the fur of the common mouse—slightly darker on the back than underneath. The eyes, beak, legs, and feet are dark in colour, and it has just 'the smooth, neat appearance that is to be seen in *Ampelis*.

A nest of this species containing three eggs was found in a bush about nine feet from the ground on the 6th of May, 1913. The eggs in size and colour were not unlike the grey type of the Red-backed Shrike's, but with the addition of some claret-coloured spots. The birds were not at all noisy at the nest, and the hen, if she was sitting, sat lightly and moved off quietly when the nest was approached. She sat very little during the day, and the cock did not seem to sit at all.

The eggs, which were plainly visible from beneath through the flimsy structure of the nest, were hatched on the 16th of May, and on the 22nd the young birds were seen to have black skin and down, while the inside of their throats, well



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1. SPINDALIS BENEDICTI.
2. SPINDALIS PRETREI.
3. SPINDALIS SALVINI.

shown by reason of their very wide gape, was bright crimson. After the young were hatched, the behaviour of the parents was interesting. When the nest was approached, the hen generally flew towards the ground, while the brilliantly coloured male went to a conspicuous place at the top of a bush. Then they spread out their wings and tails horizontally, fluffed out their feathers, and sharpened their beaks on their respective branches, moving about all the while, and either keeping silence or giving a single or double chirp, the first note of the latter being very shrill. The cock bird varied this performance sometimes by giving a sort of song of six notes. Earlier in the season he has a real song, which might be that of a canary, very much reduced in volume. One of them, which was singing on the 14th of February, 1914, was only just audible at a distance of about four feet.

The genus *Spindalis* is an interesting one as it contains seven comparatively distinct species and two less distinct subspecies confined to the West Indian and neighbouring islands. Of these one is confined to each of the larger islands, Cuba, San Domingo, Porto Rico, and Jamaica, two closely-allied forms to the Bahamas, and one each to the Isle of Pines off Cuba, Grand Cayman, and Cozumel off the coast of Yucatan.

The species from Grand Cayman, *Spindalis salvini* Cory ('Auk,' 1886, p. 499) is here figured (Pl. I. fig. 3) for the first time. It is somewhat intermediate between the Cozumel form, *S. benedicti* (Pl. I. fig. 1) and that from Cuba, *S. pretrei* (Pl. I. fig. 2). From the former it differs in its much less rich coloration, while it can at once be distinguished from the Cuban species by its larger size, and by the presence of a patch of rufous chestnut on the median coverts.

Average measurements of males are :—

<i>S. pretrei</i>		wing	75,	culmen	10 mm.
<i>S. salvini</i>		„	88,	„	12 „
<i>S. benedicti</i>	...	„	83,	„	12·5 „

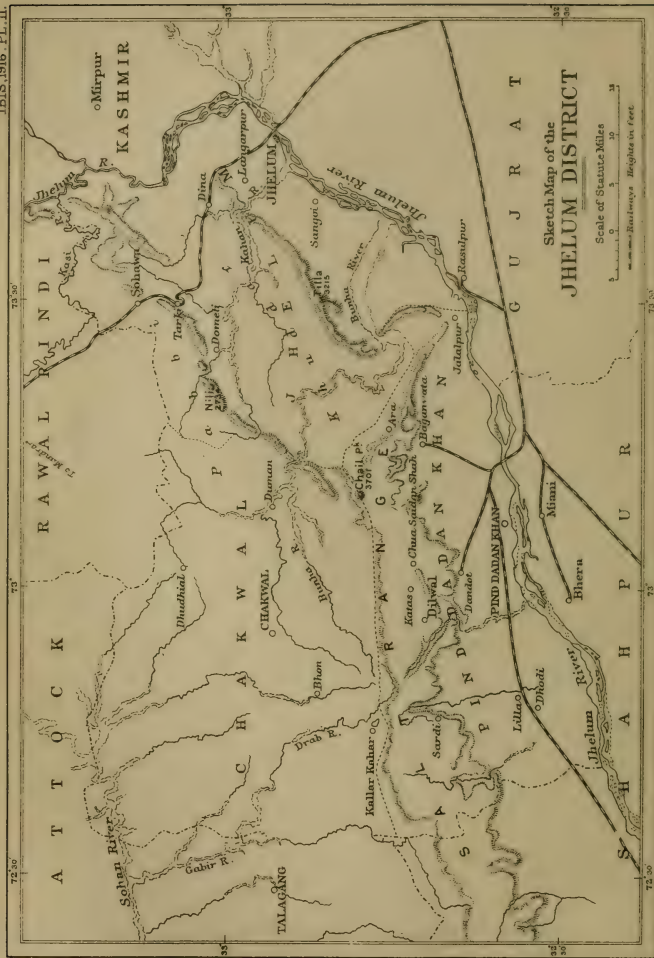
Cæreba sharpii is perhaps the most abundant of Grand Cayman birds, and seems to live and nest in every part of the island, except among the mangrove woods. Some notes on this bird, which the writer sent to Mr. P. R. Lowe, appeared in his "Observations on the genus *Cæreba*" ('Ibis,' July 1912), and, in the light of further observation, need a little correction. As regards the eggs, the "Chiff-chaff" type does not seem to be a very common one. The more usual range of colour is very much the same as that found in the eggs of the Robin; but they vary exceedingly within these limits, and it is most unusual to find any two nests with exactly similar eggs.

As to the bird's nesting-season, it seems almost impossible to say definitely how many broods there are in the year. The same nest never seems to be used (except for roosting in) more than once, and nests containing freshly laid eggs can be found in January, February, March, April, June, July, September, and October. This would seem to point to at least three broods, and to four if the nests from January to April represent two broods in quick succession.

Cæreba sharpii can build its nest and bring off its brood in twenty-eight days (*e.g.* 9th July to 6th August, 1913); as its incubation period is ten days or less, this would be quite possible.

It builds a number of nests merely to roost in, and seems quite ready at times to roost in any nest it may find empty. On the evening of the 6th of January, 1913, one had to be turned out of the nest of *Melopyrrha taylori*, referred to above, by its irate owner who, after the battle, immediately made the hen go in to "hold the fort."

This bird seems to have a curious liking for poisonous trees and bushes to nest in. "Lady's Hair" (*Malpighia*), which has on the underside of its leaves a profusion of easily detachable bright golden hairs, beautiful indeed to look at but maddening to touch, is a great favourite; and on the 20th of January, 1914, a nest was found in a Manchineel (*Hippomane*). How the birds managed to escape destruction by the poisonous juice which pours out



at a touch from the leaves and twigs of this tree was a mystery, but they brought off their brood.

To the nest-making materials already given, cotton-wool (*Gossypium*) may be added. On the 11th of February, 1914, a nest was found partly made of this.

To Mr. P. R. Lowe thanks are due for the identification of most of the foregoing birds. If his knowledge of the birds of the West Indies could have been combined with the writer's opportunities, the Grand Cayman list would, in all probability, be considerably longer than it is.

III.—*Notes on the Birds of the Jhelum District of the Punjab.* By HUGH WHISTLER, M.B.O.U. *With Notes on the Collection by* CLAUD B. TICEHURST, M.A., M.B.O.U.

(Plate II.)

It was with considerable pleasure that, on arrival from leave in England in April 1913, I learnt that I had been posted to the district of Jhelum in the Rawal Pindi division of the Punjab. Before my departure I had already spent a year in the adjoining district of Rawal Pindi, and had, therefore, a general knowledge of the avifauna which I would come across and the points on which to concentrate special attention. Besides this, there was the additional attraction that, while the whole northern and central Punjab (which was added to British territory at a comparatively late date) is but little dealt with in Indian ornithological works, the district of Jhelum had practically been left untouched, yet it is these north-western districts bordering upon the Himalayas which most repay study.

The district is thus described in the 'Gazetteer':—
"*Jhelum District.*—A district in the Rawal Pindi division of the Punjab, lying between $32^{\circ} 27''$ and $33^{\circ} 15''$ N. and $72^{\circ} 32''$ and $73^{\circ} 48''$ E., with an area of 2813 square miles.

The length from east to west is 75 miles, its breadth increasing from two miles in the east to 55 in the west. It is bounded by the districts of Shahpur and Attock on the west and by Rawal Pindi on the north, while the Jhelum River separates it from Kashmir territory on the north-east, and from Gujrat and Shahpur on the south-east and south (see map Pl. II.).

"The district naturally falls into three divisions. Of these, the north-eastern, which includes the Chakwal tahsil and the narrow Pabbi tract in the north of the Jhelum tahsil, is a wide and fertile plateau ranging from 1300 to 1900 feet above the sea, with a decided slope to the north-west, until at the Sohan River it reaches the boundary of the district. This plateau is intersected by numerous ravines, which, with the single exception of the Bunha torrent on the east, drain into the Sohan. To the south it culminates in the Salt Range, which runs in two main ridges from east to west, now parallel, now converging, meeting in a confused mass of peaks east of Katas and opening out again. Between these ranges is a succession of fertile and picturesque valleys, set in oval frames by the hills, never more than five miles in width and closed in at either end. The Salt Range runs at a uniform height of 2500 feet till it culminates in the peak of Chail (3701 feet). At the eastern end of the Salt Range two spurs diverge north-eastwards, dividing the Jhelum tahsil into three parallel tracts. The northernmost of these, the Pabbi, has already been described. The central tract, lying between the Nili and Tilli spurs, is called the Khuddar, or country of ravines. The whole surface seems to have been crumpled up and distorted by converging forces from the north and south. Lastly, south of the Tilla Range, lies the riverain tract, which extends along the river from Jhelum town in the north-east to the Shahpur border. Broken only near Jalalpur by a projecting spur of the Salt Range proper, this fertile strip has a breadth of about eight miles along the southern boundary of the Jhelum and Pind Dadan Khan tahsils."

The most important elevations are as follows :—

Tilla, 3215 feet.	Domeli Station, 1267 feet.
Sardi, 2850 feet (approx.).	Ara „ 2173 feet.
Kallar Kahar, 2171 feet.	Tarki „ 1216 feet.
Bhon, 1953 feet.	Sohawa „ 1426 feet.
Langarpur, 1292 feet.	Chakwal „ 1550 feet.
Pind Dadan Khan, 731 feet.	Jhelum „ 827 feet.
Dina, 901 feet.	

Jhelum is mentioned occasionally in books on Indian ornithology—as, for instance, in Blanford & Oates's volumes on Birds in the 'Fauna of British India' series it is given as a southern point to which *Corvus monedula* reaches, and as the type-locality for *Molpastes humei*, while in Hume's 'Nests and Eggs of Indian Birds' there are several notes on eggs taken about Pind Dadan Khan by Mr. Theobald.

These, however, are but scattered entries without connection, and in no way represent the real interest of the district. It is well worth study for several reasons. Of these, the most outstanding is its geographical position in the angle between two great masses of mountains at the meeting of the Indian and the western Palæarctic regions, and near the north-western gateway into India. The result of this position is seen both in the number of western Palæarctic birds which occur in the district as winter visitors or passage migrants, and in the clearness with which migrational movements may be noted; in the latter connection I may note that the Jhelum River appears to form a minor but well-marked migration route, so that the riverain tract, and in especial the Government Rak, may be highly recommended to future observers who desire to watch migrational movements. This Government Rak is a forest reserve, consisting of a block of thick tree and undergrowth jungle, about a mile and a half long and several hundred yards wide, situated on the river-bank just above Jhelum city. In the summer it contains nests of birds such as *Terpsiphone paradisi* and *Zosterops palpebrosa* which otherwise must be

looked for in the Salt Range; and at other times of the year it forms a harbourage for many migrants and winter stragglers, and a roosting-place for many thousands of Rooks, Jackdaws, Starlings, Mynahs, and the like.

Connected with this geographical position, two other results may be briefly noted: one is that in a large percentage of cases the species which are summer or winter visitors are also passage migrants. This may be illustrated by the case of *Siphia parva*, which arrives in great force on the autumn passage; but, although present throughout the winter, it declines very largely in numbers as the passage passes on; it increases again in spring as the passage returns and passes through, sweeping up the birds that only came so far and stayed for the winter. This must occur in the majority of cases, but is not always observable; but where the fact was clearly to be discerned in connection with a species, I have noted it.

The second fact is that during the winter one may find, in proportion to the severeness of the weather, individuals of common Western Himalayan species, *e.g.*, *Myiophonus temmincki* and *Oreicola ferrea*, which have struggled down to avoid the snow. This can hardly be classed as true migration.

One interesting feature of the district remains to be noted. The Salt Range here forms one of the most marked natural boundaries that could be found in the case of two species—*Brachypternus aurantius* and *Crateropus canorus*. During the two years that I have spent in the Jhelum and Rawal Pindi districts, I have never met with a single individual of either bird on the Rawal Pindi side of the Salt Range, while both are common residents on the Jhelum side. *Crateropus canorus* occurs in the valley gardens inside the Salt Range.

Finally, I must emphasize the fact that this article in no way pretends to be a complete list of the birds of the district, while in the cases of many of the species dealt with, their status may require revision. All I have done is to set

on record the results of a year's daily observations between April 1913 and April 1914.

While admitting that a year's observation is not sufficient for the making of a full or authoritative account of the bird-life of any given area, I set the results on record, for India is a land of fleeting tenures, and work that is not published is apt speedily to be lost. These rough notes may serve as a foundation for other observers who chance to be stationed at Jhelum, or prove useful for comparison for ornithologists working in other districts of North-West India.

The nomenclature (with one or two exceptions) is that of the four volumes on Birds by Blanford & Oates in the 'Fauna of British India' series. I have to thank both Dr. Ticehurst and Capt. C. H. T. Whitehead, M.B.O.U., for much help and interest in my observations.

[Mr. Hugh Whistler has asked me to add any notes of interest on the moults and plumages of the skins in his collection, and to identify the racial forms represented. This I have done so far as I am able, and I have also added notes on the soft parts, which were carefully recorded on the labels at the time of skinning. As I have only seen part of the collection, those birds which I have handled have the wing-measurements noted against each in millimetres.—*C. B. T.*]

Corvus corax. The Raven.

854. 10.9.13. Sardi, 2900 ft., Salt Range. ♂.

A common resident, whose numbers appear to be increased during the autumn and winter months by immigration. It breeds commonly enough in the Salt Range and over the high ground of the Chakwal tahsil. Theobald gives January and February as the months for nesting, but I found nests as follows:—February 24, c/4 fresh; February 24, c/4 incub.; March 8, c/3 incub.; March 12, nest building. Only one of these nests was built on a tree, the remaining three being placed on ledges near the top of small cliffs at the side of watercourses in the broken country about Duman and Chakwal. The birds were bold and aggressive

while the nests were being examined. One pair made several stoops at the man as he scaled the cliff-face, and for a moment or two I feared that he was in danger of being made to lose his balance; another pair settled within a yard or two of me as I approached their nest, and when I threw bits of earth to drive them away, merely watched the missiles, leaning to one side or the other to avoid them.

They are accustomed to roost in large companies. During the hot weather from June until October, when I had occasion frequently to traverse the Mandra-Chakwal tonga-road by night, I used to see about fifty birds sleeping in two trees by the roadside, and even during the nesting-season I noted evening flights of birds that were apparently making for similar roosts. In the Salt Range they are very destructive to the millet, cutting off and carrying away whole heads of the seed.

***Corvus corone.* The Carrion Crow.**

Single examples of this species were perhaps seen with the other crows in the Rak on January 13 and 20. I shot the latter but failed to pick it up, so the record must remain doubtful. It is, however, recorded as a fairly common winter visitor to Bannu, and examples are therefore likely to occur in this district.

***Corvus frugilegus.* The Rook.**

908. 27.10.1913. Jhelum. ♀. Wing 315 mm.

910. 29.10.1913. „ ♀.

913. 30.10.1913. „ ♀. Wing 292 mm.

923. 6.11.1913. „ ♀.

924. „ „ ♂. Wing 320 mm.

An extremely numerous winter visitor to the plains about Jhelum, but apparently not occurring at Chakwal or in the Salt Range except as a straggler. The first birds arrived about the third week of October, and the species was abundant by the end of the month, although its full numbers were perhaps not attained until December. It continued in force throughout January, but a decrease became apparent about the second week of February, and there were

comparatively few left by the end of the month. A few birds continued throughout March, a flock of about a hundred being seen as late as the 22nd. The last seen was a single bird on March 31.

From the vast quantities of Rooks which sleep in the Rak at Jhelum and the fact that I was unable to learn of any other roosting-place, I believe that the species is only found in the district within an easy flight of Jhelum: at any rate, I only saw it further afield on one occasion, when a small party (probably migrating) were seen on the tonga road on February 22.

Morning and evening the birds pass to and from the Rak. The evening flight commences early, and birds arrive in large flocks at intervals for two or three hours before dusk; during the warmer weather in October and November the sand-banks by the river are black with the birds that settle to drink, but this "nightcap" is stopped as the nights become cold. The morning flight is a much shorter affair, the birds departing more *en masse* soon after sunrise.

[The form *C. f. tschusii* Hartert is said to occur in north-west Punjab in winter; it differs from the typical bird in its weaker, straighter, and thinner bill. The Jhelum birds which I have examined, however, cannot be picked out from a series of the typical birds from England, whence I have birds whose bills are equally weak, straight, and thin, equal or even shorter in the wing, and whose feet are precisely similar to the Jhelum birds; therefore I must assign Mr. Whistler's specimens to the typical race.—*C. B. T.*]

Corvus splendens. The Indian House-Crow.

697 a. 28.4.1913. Jhelum. Wing 243 mm.

697. ,, ,, Wing 270 mm.

811. 12.8.1913, ,, Juv.

Resident and extremely abundant everywhere, except, of course, that but few are found on the higher portions of the Salt Range, where there is not much to attract them. Nidification begins about the middle of June, most eggs being

found from the end of the month until the middle of July. Thousands roost in the Rak all the year round, and I could see no diminution in the morning and evening flights even during the nesting-season. The mortality amongst them appears to be very heavy, as the ground in the Rak is littered with remains; some of the deaths are doubtless due to disease, as on several occasions I caught sickly birds on the ground, but the majority of the remains are undoubtedly those of birds who have fallen into the clutches of the Eagle-owls and Peregrines which haunt the jungle.

[In one of the April birds the plumage is worn and the wings brownish, it is moulting heavily on body and tail; the other is in full fresh feather. The juvenile differs from the adult in having the crown and throat less black, the nape less grey, and the underparts less pure, as well as being less glossy generally.—*C. B. T.*]

Corvus monedula. The Jackdaw.

922. 6.11.13. Jhelum. Wing 240 mm.

950. 11.12.13. „ ♂.

977. 10.1.14. „ ♀. Wing 224 mm.

979. 20.1.14. „ ♂. „ 242 mm.

996. 30.1.14. „ „ 235 mm.

A common winter visitor to the immediate neighbourhood of Jhelum, but not noted elsewhere. They first arrived about the middle of October, and became common by the end of that month, continuing numerous until well into February: up till this time they had always been found in company with the Rooks, roosting with them in the Rak and joining in the morning and evening flights. But during the second half of February small flocks composed of Jackdaws alone were noted (in addition to the birds in the flocks of Rooks); this fact probably indicated the commencement of the return migration, marked by a separation of the two species consequent on their different destinations. By the middle of March there were but very few about, the last bird being noted on the 28th of that month.

[Nos. 922, 977, and 996 are typical *C. m. collaris* ; 979 is not to be distinguished from British-shot specimens, its underparts being no paler, and there is no trace of any collar round the neck. The January birds through wear are already becoming brown on the exposed parts of the wing.—*C. B. T.*]

Dendrocitta rufa. The Indian Tree-Pie.

Common in the gardens of Chua Saidan Shah, when I was there in June and July. It is probably a resident. A pair seen on the Chakwal tonga-road on February 22nd, near Dudhial, were the only ones met with outside the Salt Range.

Parus atriceps. The Indian Grey Tit.

939. 1.12.13. Jhelum. ♂.

1363. 5.4.14. „ ♀. Wing 71 mm.

A common winter visitor, usually collecting in flocks. The first individual was noted on October 11, and the species became fairly general at once, and numerous by the end of the month. The return migration probably started about the beginning of March, but there were a fair number of birds remaining until the end of the month : an odd bird or two were seen as late as the 4th and 5th of April.

[Iris dark brown ; feet lead-blue ; bill black.—*C. B. T.*]

Parus monticola. The Green-backed Tit.

1305. 13.2.14. Jhelum. Wing 64 mm.

Status not quite certain, but probably a winter visitor in small numbers from the latter half of October until the end of February.

[Iris dark brown ; feet lead-blue ; bill bluish black, lighter at the base.—*C. B. T.*]

Anthoscopus coronatus. The Turkestan Penduline Tit.

Although no specimen was obtained, I have no hesitation in referring to this species a party of small birds seen in the Rak on March 27, 1914, and recorded by me in the *Journal of the Bombay N. H. S.* vol. xxiii. p. 153.

Within Indian limits these Tits have previously been recorded only from Kohat and Sind.

Argya caudata. The Common Babbler.

730. 24.5.1913. Chakwal. ♂. Wing 83 mm.

Resident and very numerous in the Salt Range and the high plateau of the Chakwal tahsil; it is probably double-brooded, as nests may be found from April until June.

[Iris yellow-brown; feet olive-yellow, claws dusky; bill olive-green, blackish at tip; orbicular olive-lead; tail in moult.—*C. B. T.*]

Crateropus canorus. The Jungle Babbler.

738. 30.5.1913. Jhelum. Wing 109 mm.

An abundant resident, but somewhat locally distributed; it is common in the Rak and in the gardens of Chua Saidan Shah, but is not met with in that portion of the district which lies north of the Salt Range, nor does it occur in Rawal Pindi district; the northern crest of the Salt Range must therefore be taken as its extreme boundary in this part of India. It nests very commonly in the Rak throughout June, but I found a nest containing a single egg on March 27, and a nest with four eggs on April 8.

[Iris pale yellowish white; feet fleshy white; bill flesh-coloured, gape yellowish.—*C. B. T.*]

Myiophoneus temmincki. The Himalayan Whistling-Thrush.

A single bird was seen on December 21 at Tarki, where it was frequenting the stony hill above the railway: a winter straggler only.

Zosterops palpebrosa. The Indian White-eye.

754. 7.6.1913. Jhelum. Wing 58 mm.

911. 30.10.1913. „ „ 57 mm.

984. 23.1.1914. „ ♂. „ 58 mm.

Exact status uncertain: it nests commonly enough about June in the Rak and the gardens of the Salt Range, and is fairly common during the winter throughout the district. But having regard to the fact that in the Punjab, N.W. Frontier Province, and N.W. Himalayas generally, the White-eye is migratory, I do not feel sure that the winter

birds are the same individuals as those that breed here. For it may be noted that the species appears to be less common in winter than in summer, while that would hardly be the case if the summer birds stayed on with the birds that *must* arrive in winter from the hills. In the breeding-season the males sing freely—the song is short and rather pretty: it begins so low as to be almost inaudible, and becomes louder and louder until at the end it is almost harsh, and this is repeated again and again without variation.

[Iris yellow-brown; feet lead-blue; bill lead-blue, basal part of lower mandible very dark.—*C. B. T.*]

Hypsipetes psaroides. The Himalayan Black Bulbul.

1304. 13.2.1914. Jhelum. ♂. Wing 115 mm.

A winter visitor in flocks to Jhelum itself, but not observed elsewhere. It arrived in the first week of February and stayed until about the middle of March, when its numbers decreased, a few remaining throughout the month. The last party was noted on the 8th of April. They fed freely on unripe mulberries, and were easily observed owing to their noisy and incessant calls.

[Iris dark brown; bill and feet coral-red, claws black.—*C. B. T.*]

Molpastes intermedius. The Punjab Red-vented Bulbul.

750.	5.6.1913.	Jhelum.	♀.	Wing 98 mm.
764.	17.6.1913.	„	♀.	„ 97 mm.
773.	1.7.1913.	Chua Saidan Shah.	♀.	„ 89.5 mm.
777.	28.6.1913.	Jhelum.	♀.	„ 92 mm.
785.	13.7.1913.	„	♂.	„ 91.5 mm.
790.	18.7.1913.	„	♀.	„ 95 mm.
834.	23.8.1913.	„		„ 93 mm.
931.	20.11.1913.	„	♀.	„ 98 mm.
985.	24.1.1914.	„	♂.	„ 99 mm.
1307.	15.2.1914.	„	♀.	„ 98 mm.
1308.	16.2.1914.	„	♂.	„ 98 mm.
1315.	19.2.1914.	„	♀.	„ 96.5 mm.
1317.	25.2.1914.	„	♂.	„ 104 mm.

A common resident throughout the district. A large series was collected because the birds found at Jhelum were in many cases somewhat intermediate in plumage between *Molpastes intermedius* and *Molpastes hæmorrhous*, the Red-vented Bulbul of the southern Punjab.

No hybrids between this species and *Molpastes leucogenys* were obtained, but in Jhelum itself, where most of my collecting was done, the latter bird is very scarce; however, on 24th of May at Chakwal, I saw signs of courting rivalry between two *M. intermedius* and one *M. leucogenys*.

This Bulbul breeds from May until August, the majority of nests being found in May and June.

[The June and July birds are in worn breeding-dress, the November bird is in fresh-moulted dress. 785 and 834 are juvenile birds moulting into first winter plumage, the wings and tail being moulted as well as the body-feathers. The juvenile dress differs from that of the adult in having the throat and head brown, the under tail-coverts orange-red instead of crimson, and the wing and tail paler brown, the latter with buff tips instead of white. *M. hæmorrhous* of the southern Punjab differs from *M. intermedius* from northern Punjab in having the black of the crown sharply marked off from the hind-neck and in having black ear-coverts instead of brown; typical birds were obtained by Mr. Whistler from Hissar and Ferozepur, whilst typical *M. intermedius* were met with at Rawal Pindi. The Jhelum birds are rather difficult—750, 764, 931, and 1308 are typical *M. intermedius*; all the other adults, whilst having the brown ear-coverts of *M. intermedius*, have the black crown more or less sharply marked off from the hind-neck as in *M. hæmorrhous*. As typical *M. hæmorrhous* was not found at Jhelum, though looked for, it appears that there can be no question of interbreeding, but rather a variation of one race towards the other.—C. B. T.]

Molpastes leucogenys. The White-checked Bulbul.

735. 27.5.1913. Dalur, Salt Range. ♂. Wing 91 mm.

A resident and partial migrant. It breeds very commonly from May to July all over the Salt Range, and numbers descend during the winter to the Chakwal Plateau, where

they are numerous enough from October to April. At Jhelum they are seldom seen; a pair roosted in one particular tree in my compound from about 25th February to 16th March, and a party of five were seen by the river on the evening of 25th March. These were certainly migrants, as the place where they were found was a favourite resting-place for migrating birds, and no others were seen near there during the rest of the year. These five birds were very restless, calling and flying up to hover in the air as if they were impatient to be off again. I emphasize the point, as the species is usually considered most strictly non-migratory.

Theobald's note on the nesting of *Molpastes leucotis* in the Salt Range (Hume, 'Nests and Eggs,' 2nd ed. vol. i. p. 177) must be a mistake and must refer to this species, which he does not otherwise mention. I did not meet *M. leucotis* anywhere within the district.

***Molpastes humii*.** Hume's White-eared Bulbul.

The type-specimen of this species was obtained at Jelalpur in 1871 (Fauna B. I., Birds, vol. i. p. 274). It would be advisable to examine this specimen again with reference to Messrs. Magrath and Whitehead's discovery of the presence of hybridism in this genus.

***Sitta* sp.?**

A White-cheeked Nuthatch was seen in the Rak on October 29, but I failed to secure it and could not identify the species.

***Dicrurus ater*.** The Black Drongo.

737. 29.5.1913. Jhelum. ♂. Wing 147 mm.

A resident in small numbers and a very abundant summer visitor, breeding freely in May and June. It is rather difficult to observe their movements accurately, but the vast mass of King Crows probably arrive in March and reach their full numbers by the end of the month, continuing in full force until well into September. The return migration is a leisurely one, spread out until the middle of November. From then onwards, until the end of February, the species is distinctly scarce; but there is, perhaps, a slight increase in

January and February which is the forerunner of the spring immigration of March.

The pugnacity of the Drongo is well known, but I was surprised to see one attack a Merlin that I dislodged from some cover. It was a pretty sight to see both birds twisting and fluttering together.

[Iris red-brown; bill and feet black.—*C. B. T.*]

Certhia himalayana. The Himalayan Tree-Creeper.

897. 11.10.1913. Jhelum. Wing 66·5 mm.

A common winter visitor from the middle of October until the middle of March, first seen on October 11 and last noted on March 25. They are often seen accompanying the flocks of Tits and Warblers.

[Feet and bill dark brown, basal two-thirds of lower mandible flesh-coloured.—*C. B. T.*]

Tichodroma muraria. The Wall-Creeper.

999. 8.2.1914. Jhelum. ♂. Wing 102·5 mm.

1339. 13.3.1914. Dumman. „ 98 mm.

A winter visitor in small numbers, occurring from January until about the middle of March. It was usually found in the broken ground of the Chakwal Plateau, but No. 999 was shot from a low earth-cliff on the edge of the river. It had been observed in the same place on January 12.

[Iris brown; feet and bill black.

999 is in winter plumage; 1339 is moulting the whole of the upper parts and the throat, and is nearly in full summer plumage.—*C. B. T.*]

Acrocephalus dumetorum. Blyth's Reed-Warbler.

807. 8.8.1913. Jhelum. ♂. Wing 62·5 mm.

813. 13.8.1913. „ ♂. „ 62·5 mm.

812. „ „ „ 60 mm.

822. 18.8.1913. „ ♂. „ 60·5 mm.

832. 21.8.1913. „ ♂. „ 63 mm.

833. „ „ „ 60 mm.

1375. 12.4.1914. „ ♂. „ 62·5 mm.

An abundant passage migrant in March, April, and May, and again in August, September, and October.

[Iris light brown; bill brown above, flesh-coloured below; tarsi and feet brown, soles yellowish; gape and mouth yellow.

All the autumn-shot birds are in very worn breeding-dress except 812, which is freshly moulted; the April bird is in rather less-worn plumage. On a large series I find the wing-formula varies: most commonly the second primary is equal to the fifth or sixth or between the two, exceptionally it is between the fourth and fifth or sixth and seventh.—*C. B. T.*]

Acrocephalus agricola. The Paddy-field Reed-Warbler.

896. 11.10.1913. Jhelum. ♂.

A passage migrant, but exact status uncertain.

[Iris yellow-brown; feet lemon; bill dark horn-coloured, flesh-coloured at the base of lower mandible.

This bird has nearly finished a complete moult; I am unable to state to which race it belongs.—*C. B. T.*]

Orthotomus sutorius. The Indian Tailor-Bird.

A very common resident, occurring both in the plains and the gardens of the Salt Range. Breeds in May and June. I found it extremely difficult to secure eggs from the fact that the birds deserted unfinished nests as soon as they had been found and looked at, even if not touched.

Cisticola cursitans. The Rufous Fantail-Warbler.

720. 10.5.1913. Jhelum. ♂. Wing 52.5 mm.

Noted commonly from March until August, but largely or entirely disappearing during the winter.

[Iris yellow-brown; feet light brown; bill black-brown above, light flesh-coloured below.

Complete moult just commenced.—*C. B. T.*]

Hypolais rama. Sykes's Tree-Warbler.

740. 30.5.1913. Jhelum. ♂. Wing 61.5 mm.

831. 21.8.1913. „ ♀.

865. 17.9.1913. „ ♂.

885. 3.10.1913. „

1353. 25.3.1914. „ ♂. Wing 59.5 mm.

A spring and autumn passage-migrant in small numbers. On the spring migration it was met with as late as June, when individuals were found singing in the dense mulberry undergrowth of the thicker parts of the Rak.

[Iris brown; feet dull brown; bill dark brown above, horn-coloured below.

The remarks of Mr. Whistler, and the fact that the bird shot on May 30 had the testes much enlarged, suggest that this species was breeding in the Jhelum district. This would be an extension of the breeding-range (see Hartert, Vög. pal. Faun. p. 575). The autumn specimens are just completing an entire moult, and the underparts are much more washed with buff at this time of year than in the spring.—*C. B. T.*]

Sylvia affinis. The Indian Lesser Whitethroat.

884. 3.10.1913. Jhelum. ♀. Wing 64 mm.

1333. 9.3.1914. „ „ 67.5 mm.

A common passage-migrant in March and April, and from August to October; also a winter visitor in smaller numbers. It is usually to be met with feeding in Kikur trees, the forehead being often heavily covered with pollen from the yellow blossoms.

[Iris brown; feet dark blue-grey; bill blue-grey at base, blackish at the tip.

The March bird is going through a complete body moult, which includes the inner three tertials; rest of wings and tail moderately worn. Although the differences in colour between this race and *S. c. curruca* are not constant, I find that in a large series the wing-formula of *S. affinis* is strangely constant, the second primary being between the sixth and seventh. In a series of *S. curruca* it is between the fourth and fifth or fifth and sixth.—*C. B. T.*]

Phylloscopus tristis. The Brown Willow-Warbler.

671. 10.4.1913. Dhodi. Wing 55 mm.

899. 14.10.1913. Jhelum. ♀. „ 56.5 mm.

900. „ „ „ 57 mm.

915. 1.11.1913. „ „ 60.5 mm.

917.	4.11.1913.	Jhelum.	Wing 61 mm.
918.	"	"	" 58.5 mm.
948.	10.12.1913.	" ♀.	
968.	3.1.1914.	"	" 62.5 mm.
1303.	12.2.1914.	"	" 65 mm.
1358.	30.3.1914.	" ♀.	" 55 mm.
1359.	31.3.1914.	" ♀.	" 54.5 mm.
1374.	11.4.1914.	" ♀.	
1376.	12.4.1914.	" ♀.	" 53 mm.

The most abundant species of Willow-Warbler that occurs in the district, being found as a winter visitor from September (a few individuals probably arriving in August) until about the end of April. Most abundant in the Rak, where it particularly affected the tangle of roots and leafy branches of the Irabi bushes which jut over the river along the whole margin of the eroded banks.

[Iris and feet dark brown, soles yellowish to olive; bill dark brown, base of lower mandible greyer.]

The March and April birds have commenced to moult the body-feathers. January and February specimens are worn. —C. B. T.]

Phylloscopus subviridis. Brooks's Willow-Warbler.

914.	1.11.1913.	Jhelum.	♀.	
937.	1.12.1913.	"		Wing 5.15 mm.
1337.	11.3.1914.	Dumman.		" 54.5 mm.

A winter visitor in small numbers to the district.

[Bill brownish black, gape and base of lower mandible yellow; feet dull brown, soles olive-yellow.]

The March bird is moulting its body-feathers.—C. B. T.]

Phylloscopus humii. Hume's Willow-Warbler.

933.	21.11.1913.	Jhelum.	♂.	Wing 59.5 mm.
940.	2.12.1913.	"		" 54 mm.
1302.	12.2.1914.	"		" 55.5 mm.
1310.	17.2.1914.	"		" 53 mm.
1380.	15.4.1914.	"	♀.	" 52 mm.

A winter visitor to the district, where it is rather more common than the last species.

[Iris dark brown; feet brown, soles yellowish; bill dark brown, base of lower mandible paler; orbicular plumbeous.

The February birds are in worn plumage; the April bird is doing a complete body-moult. All five specimens lack any trace of coronal streak.—*C. B. T.*]

Acanthopneuste nitidus. The Green Willow-Warbler.

672. 10.4.1913. Dhodi. ♂. Wing 64 mm.

806. 7.8.1913. Jhelum.

1371. 11.4.1914. „ ♂. Wing 66 mm.

1373. „ „ „ 67 mm.

A common spring and autumn passage-migrant about April and August.

[Iris dark brown; feet brown, soles yellowish; bill dark brown above, flesh-brown below.

The April birds have recently moulted the body-feathers.—*C. B. T.*]

Acanthopneuste viridanus. The Greenish Willow-Warbler.

819. 17.8.1913. Jhelum. ♀. Wing 57.5 mm.

837. 31.8.1913. „ „ 62 mm.

841. 4.9.1913. „ „ 58.5 mm.

842. „ „ ♂.

Met with in fair numbers on the autumn migration in August and September.

[Iris dark brown; feet brown, soles yellow; bill brown above, basal two-thirds of lower mandible yellow.

The August birds are in freshly moulted feather.—*C. B. T.*]

Acanthopneuste occipitalis. The Large Crowned Willow-Warbler.

821. 18.8.1913. Jhelum. Wing 64.5 mm.

1372. 11.4.1914. „ ♂.

A spring and autumn passage-migrant about April and August, but less common than the last two species.

[Iris dark brown; bill dark brown above, yellow below; tarsus lead-brown, feet yellower.—*C. B. T.*]

Cryptolopha xanthoschista. Hodgson's Grey-headed Fly-catcher-Warbler.

930. 16.11.1913. Jhelum. Wing 51 mm.

966. 2.1.1914. „ „ 51 mm.

A winter visitor in small numbers; noticed on various dates between November 16 and February 27. Met with either singly or in couples hunting in trees for insects after the manner of Willow-Warblers.

[Iris dark-brown; feet lead-brown; bill dark brown, basal two-thirds of lower mandible yellow.—*C. B. T.*]

Prinia lepida. The Streaked Wren-Warbler.

Found breeding in April and May in small numbers on the river islands above Jhelum, but the ground there is not very suitable for them. If they occur anywhere commonly in the district, it will be in the river-bed about Pind Dadan Khan, a tract which I had not an opportunity of examining.

Prinia inornata. The Indian Wren-Warbler.

719. 10.5.1913. Jhelum. ♀.

787. 15.7.1913. „ ♂.

814. 13.8.1913. „

919. 4.11.1913. „

929. 16.11.1913. „

982. 22.1.1914. „ ♀.

A common resident. On March 22 I found a nest with four eggs of the rare type which has the ground-colour white instead of blue-green.

Lanius lahtora. The Indian Grey Shrike.

710. 7.5.1913. Jhelum. Wing 115 mm.

731. 24.5.1913. Chakwal. „ 117 mm.

732. „ „ Juv. „ 113.5 mm.

947. 8.12.1913. „ „ 108.5 mm.

A common resident, being particularly numerous over the high ground of the Chakwal tahsil. The breeding-season is from March until May.

[*Adult*. Iris dark brown; bill and feet black; mouth flesh-coloured.

Juvenile. Bill lead-brown above, greyer below; mouth dull yellow; feet lead-grey.

732 is in full juvenile plumage, in which the whole of the upper parts are grey washed with buff, and all the coverts and inner tertials are tipped with buff. 917 is almost out of juvenile plumage by complete body-moult, which includes the moult of inner tertials.—*C. B. T.*]

***Lanius vittatus*.** The Bay-backed Shrike.

846. 5.9.1913. Jhelum. Imm. Wing 79 mm.

A resident in small numbers, largely reinforced during the summer months by breeding immigrants; these arrive in March, breed in April, May, and June, and start to depart in August, and have all gone again by the end of September.

[A juvenile just commencing to moult; it has the upper parts greyish-brown barred with dark brown, tail rufous-brown, ear-coverts dark brown, underparts cream-white, wings brown.—*C. B. T.*]

***Lanius erythronotus*.** The Rufous-backed Shrike.

925. 27.9.1913. Jhelum. ♀. Wing 91.5 mm.; tail 115 mm.

I noted only a few of these Shrikes on various dates from March until May and in October and November, which would suggest that they are passage migrants only. But, from my previous knowledge of the species in other districts, I am inclined to think that this is not a correct description of their status. In Hume's 'Nests and Eggs' (2nd ed. vol. i, p. 320) there is a note of Theobald's that it nests in May in the Salt Range. Its exact status in the district must be considered in need of verification.

[Just finishing a complete moult.—*C. B. T.*]

***Lanius isabellinus*.** The Pale-brown Shrike.

934. 25.11.1913. Chakwal. Wing 92 mm.

971. 10.1.1914. Jhelum. ♂. „ 91 mm.

A winter visitor in small numbers from about the latter half of October until the middle of March.

[Iris brown; feet lead-black; bill brown, base of lower mandible horny-lilac.—*C. B. T.*]

Pericrocotus brevirostris. The Short-billed Minivet.

A common winter visitor, found usually in flocks. They arrive at the beginning of November and mostly depart in March, but a single bird was seen as late as April 4.

Pericrocotus peregrinus. The Small Minivet.

733. 26.5.1913. Chua Saidan Shah. ♀. Wing 68 mm.
(worn).

832. 18.8.1913. Jhelum. ♂. In moult.

A resident, usually met with in small parties, but not very common. There appears to be a slight increase in their numbers during the winter, so the species may be to a small extent migratory. No. 733 was shot from a nest containing three eggs.

[832 is a juvenile just finishing a complete moult.—*C. B. T.*]

Oriolus kundoo. The Indian Oriole.

728. 15.5.1913. Jhelum. ♂. Wing 136 mm.

739. 30.5.1913. „ ♀. „ 138 mm.

743. 31.5.1913. „ ♂. „ 139 mm.

745. 2.6.1913. „ ♂. „ 137 mm.

748. 4.6.1913. „ ♀. „ 131 mm.

768. 21.6.1913. „ ♂. „ 137 mm.

769. „ „ ♀. „ 136 mm.

771. 1.7.1913. Chua Saidan Shah. ♂. Wing 139 mm.

775. 26.6.1913. Jhelum. Wing 137 mm.

776. „ „ Juv.

781. 8.7.1913. „ ♂. „ 140 mm.

A common summer visitor and passage-migrant from the middle of April until the end of September, the earliest and latest dates on which individuals were seen being April 10 and October 3 respectively. The autumn migration appears to commence in the latter half of August, and the majority

are gone by the middle of September. It is interesting to note that on August 24 there were numbers about the touga-road from Chakwal to Mandra which were clearly migrating birds, as the locality is unsuited to them; during the many other journeys I made over that road I saw the species but seldom. This Golden Oriole breeds freely in the Rak and the gardens of the Salt Range from the middle of April to the middle of July. The percentage of pairs in which both birds are in full plumage appears to be very small.

[Mr. Whistler's series of Orioles is very interesting, and shows the different plumages at different ages; 781 and 743 are fully adult, 745 and 728 have the dark part of the tail yellowish olive-green, which extends to the outer webs of all the feathers, and there is no black on the wing-coverts; above both are coloured alike and both are streaked with brownish black below. However, 728 has more yellow in the plumage of the underparts than the other (whose throat is greyish white), and its bill is dull claret where the other is only tinged with this colour, while the tips of the primary-coverts make much more of a yellow wing-spot, rather more yellow on the inner webs of the wing, and the lores and orbicular are more marked, so that I am inclined to regard this bird as 24 months old and the greyer duller bird as 12 months old. If this is so, then 768 must be 36 months old with primaries blacker, loral mark and wing-coverts mixed with black, the dark portions of the tail blacker and not reaching the tip of the outer web, while the yellow on the inner web is larger and the upper and under parts of rather a brighter hue. Of the females, 771, 748, 769 have grey throats and their tails are similar, but two of them are yellower underneath than the third; they are similar above, but one has a slight indication of black on the median coverts. I regard these as all probably being 12 months old, though it is difficult to be sure; 771 was paired with a fully adult male, and 769 was paired with 768, which I have regarded as 36 months old. 739 may be of this age also; its wings and tail are like the other three, but it has the throat yellow

and the rest of the plumage slightly brighter. 775 is a brighter bird still, and certainly an older bird; it has a considerable amount of black in the coverts, the dark parts of the tail blacker, and the yellow is of greater extent in both webs. 776 is in juvenile plumage, and has the upper parts greyish green with pale tips to the feathers; head, neck, and ear-coverts yellowish green; whole of underparts white with dark median streaks except on chin and throat.—*C. B. T.*]

Pastor roseus. The Rose-coloured Starling.

815. 13.8.1913. Jhelum. Imm. Wing 123 mm.

818. „ „ ♂ ad. „ 132 mm.

824. 18.8.1913. „ Imm. „ 124 mm.

829. 21.8.1913. „ Imm. „ 125 mm.

830. „ „ Imm. „ 128 mm.

Only noted as an autumn passage-migrant, arriving towards the end of July and departing by the end of September. Yet the species is recorded from Kohat (Whitehead, 'Ibis,' 1909, p. 131) as a spring and autumn migrant in vast hordes.

No birds were observed in the district on the spring migration, although when I left on transfer at the middle of April they were about in some numbers as close as Gujranwala, and in countless flocks in the southern Punjab.

[818 and 829 are in very worn breeding-plumage; the others are in full juvenile plumage.—*C. B. T.*]

Sturnus humii. The Himalayan Starling.

877. 30.9.1913. Jhelum. Wing 119 mm.

878, 879. 1.10.1913. „ „ 116 mm.

1369. 9.4.1914. „ ♂ „ 117 mm.

[The above are probably *S. humii*; they have the crown purple-blue, ear-coverts green, mantle purple-bronze, scapulars bronze, rather paler edges to the wings and under wing-coverts, and are marked much more heavily and with larger spots than *S. poltaratskyi* and *S. vulgaris* in similar plumage, so that the belly is nearly white.—*C. B. T.*]

<i>Sturnus menzbieri</i> . The Common Indian Starling.			
921.	5.11.1913.	Jhelum. ♀.	Wing 130 mm.
928.	10.11.1913.	„ „	131 mm.
967.	3.1.1914.	„ ♂.	130 mm.
980.	22.1.1914.	„ ♀.	127 mm.
1323.	26.2.1914.	„ ♀.	120 mm.
1318.	26.2.1914.	„ ♂.	132 mm.
1342.	28.2.1914.	„ „	128 mm.

Starlings were more or less abundant in the district from the beginning of October until the end of March, but a few were to be met with for a week or two before and after those times respectively. It is extremely difficult to work out the exact status of different races of these birds, when more than one occurs in the same locality, but I here append a tentative scheme for the above two races, without, however, being able to vouch for its accuracy. According to my observations, therefore, of the two races (no other race was obtained), *Sturnus humii* passed through in small numbers from the middle of September until the middle of October; it was then replaced by *Sturnus menzbieri*, which increased and became very abundant throughout November, declining again throughout January, and being largely, if not entirely, replaced by *Sturnus humii* about the middle of February. The latter became extremely abundant again by the end of February, but had decreased by the end of March, only a few remaining on into April. Throughout their stay Starlings took part in the nightly flight of birds to roost in the Government Rak.

[These are all typical *Sturnus vulgaris poltaratskyi*.—*C. B. T.*]

Temenuchus pagodarum. The Black-headed Mynah.

A few birds were noted at Chua Saidan Shah at the end of May and the end of June, so it probably breeds in the garden-areas throughout the Salt Range.

A single specimen was noted in Jhelum on April 22.

Acridotheres tristis. The Common Mynah.

A very common resident everywhere, including the Salt Range. Tremendous numbers arrive nightly to roost in the Rak with the Crows.

Acridotheres ginginianus. The Bank Mynah.

751. 6.6.1913. Jhelum. ♂. Wing 128 mm.

Exact status uncertain: small numbers occurred on the golf-course and joined the evening flight to the Rak from the end of May until the latter half of July. Also a few birds were met with in various places in August, September, November, February, and March.

Hume states that the species nests on the Jhelum river, but does not state in what district.

[Iris red; feet orange; bill reddish orange; facial skin red except middle of eyelid, which is grey.—*C. B. T.*]

Æthiopsar fuscus. The Jungle Mynah.

801. 1.8.1913. Jhelum. Imm. Wing 120 mm.

825. 18.8.1913. „ ♂. „ 127 mm.

891. 8.10.1913. „ Imm.

A common winter visitor from about the middle of August until the end of April, but I have only noted it in the immediate neighbourhood of Jhelum. Their numbers appear to be greatly augmented by migrants in March and April, when they collect in large parties.

[*Adult*. Iris bright yellow; feet duller, claws black; bill orange-yellow, base of lower mandible blackish.

Juvenile. Iris yellow tinged with green; feet dirty yellow; bill yellow, tinged with red on lower mandible.

The adult has just commenced a complete moult; the juvenile plumage differs in having the upper parts brown edged with lighter brown, throat and chin dusky white, and the lower throat and breast lacks most of the slate-grey wash.—*C. B. T.*]

Muscicapa grisola. The Spotted Flycatcher.

855. 10.9.1913. Sardi, Salt Range. ♂. Wing 90 mm.

This specimen was the only one met with; it was observed in a small tree in the compound of the resthouse of Sardi, and was, of course, on migration.

[This belongs to the paler eastern form *M. g. naumanni*.—*C. B. T.*]

Siphia parva. The European Red-breasted Flycatcher.

912. 30.10.1913. Jhelum. ♀. Wing 66 mm.

938. 1.12.1913. „ ♀. „ 71 mm.

970. 8.1.1914. „ ♂. „ 69 mm.

1319. 26.2.1914. „ ♀. „ 68 mm.

An abundant spring and autumn passage-migrant, and a winter resident in much smaller numbers; the spring passage takes place in March and April, the last bird noted being seen on April 27. The autumn passage starts in October (the first bird was met with on October 4), and continues until the middle of November. An occasional adult male was noted in January and February.

[Feet and iris dark brown, soles yellow-brown; bill brown, horny at base. I have carefully compared these specimens with eastern and western European specimens, with which they are exactly similar. 1319 is moulting on the chin and throat; one specimen from Rawal Pindi, I may here note, is on March 28 moulting the head and throat and has attained the blue ear-coverts, moustachial streak, and light loreal patch. 970 has chin, throat, and ear-coverts rusty, and is not moulting.—C. B. T.]

Terpsiphone paradisi. The Indian Paradise Flycatcher.

755. 7.6.1913. Jhelum. ♂. Wing 88 mm.; tail 99 mm.

756. „ „ ♀. „ 82 mm.; tail 90 mm.

A spring and autumn passage-migrant in small numbers; a few birds must remain in the summer in the plains, as the two specimens (both in the chestnut plumage with short tails) were shot from a nest with four eggs, built in the middle of the Rak. In the Salt Range gardens it breeds in great numbers in May and June, but I had no opportunity of observing its status there during the remainder of the year. The spring passage through Jhelum occurs in April, the first bird being noted on April 9; the autumn passage takes place in August and September.

[Iris dark brown; feet lead-blue; bill and eyelid cobalt-blue.—C. B. T.]

Rhipidura albifrontata. The White-browed Fantail Fly-catcher.

758.15.6.1913. Jhelum. ♀.

A common resident; its numbers are perhaps increased by immigration in October and November for the winter months, but I am not quite certain on this point. Breeds in June.

Rhipidura albicollis. The White-throated Fantail Fly-catcher.

A rare straggler from the hills. A pair were seen in the District Board garden on November 5, and a single one was noted in the same place on January 13.

Pratincola caprata. The Common Pied Bush-Chat.

685. 21.4.1913. Jhelum. ♀. Wing 70 mm.

A common summer visitor, first noted on February 19 and last on September 15. Nests found in April.

[Probably belongs to the form *P. c. rossorum*, as males from Phelland, Rawal Pindi, and Ferozepur certainly do.—*C. B. T.*]

Pratincola maura. The Indian Bush-Chat.

850. 9.8.1913. Lilla. Imm. Wing 70 mm.

944. 7.12.1913. Chakwal. ♂. „ 73 mm.

A winter visitor, but not very abundant, from September until the beginning of April. There is, however, as one would expect, a marked increase on passage in March, and again in September, of birds that winter further south and nest in the western Himalayas. Hume's statement ('Nests and Eggs,' 2nd ed. vol. ii. p. 48), "Occasionally they breed in the Salt Range," probably refers in part to the Jhelum district.

[These are *Pratincola torquata indica* Blyth.—*C. B. T.*]

Oreicola ferrea. The Dark-Grey Bush-Chat.

904. 20.10.1913. Jhelum. ♂. Wing 69 mm.

1322. 27.2.1914. „ ♂. „ 70 mm.

A straggler from the Himalayas only. The two specimens

(which were the only ones noted) were both obtained in the District Board garden.

[Iris dark brown; feet and bill black.—*C. B. T.*]

Saxicola picata. The Pied Chat.

A winter visitor in small numbers from the second half of August until about the first week of March. Numerous during the autumn migration until about the middle of October. Last noted on March 8.

Saxicola capistrata. The White-Headed Chat.

1335. 11.3.1914. Duman. ♂. Wing 95 mm.

945. 7.12.1913. Chakwal. ♀. „ 87 mm.

The most abundant of the Wheatears found in the district: it occurs from the second half of August until about the middle of March, being last noted on March 13. This and the preceding species are now lumped together as one dimorphic species, and when both occur together they certainly behave and mingle together as if one species; but I noted that, whereas *S. capistrata* and *S. picata* were found equally commonly during the autumn migrations, *S. picata* disappeared almost entirely during the winter, while *S. capistrata* remained common. Hence I prefer to keep the two forms apart. The White-headed Chat frequently comes into buildings to roost.

[Mr. Whistler's notes on the distribution in point of time on this supposed dimorphic species are of interest. Major Whitehead ('Ibis,' 1909, p. 216), noted also a difference in the Kohat district. Thus he says of *S. picata*: "fairly common winter visitor from October to March . . . nests freely on the Samana"; of *S. capistrata* he says: "cold weather visitor, very abundant from the third week in August till April . . . In the Kurram valley it nests freely round Parachinar from 4500 to 6500 feet, but rarely as high as 9000 feet." He seems to imply a different breeding habitat for the two forms. Dr. Hartert kindly sent me from Tring some females to compare with Mr. Whistler's birds; they were from Baluchistan, and were quite different from these Punjab birds from Jhelum

and Rawal Pindi in being much darker above and below, and this difference would seem to bear out what Oates says in the 'Birds of India,' when he describes the female of *S. capistrata* as being like *S. picata*, but the chin and throat and breast light fulvous, very little darker than the rest of the lower plumage, upper parts more sandy. In Mr. Whistler's females the lower breast and belly are white. Looked upon in recent years as a case of dimorphism, I think it is still an open question which might be settled by collecting breeding pairs, as, if it finally proves to be a case of dimorphism, the females as well as the males are dimorphic.—*C. B. T.*]

Saxicola opistholeuca. Strickland's Chat.

835. 28.8.1913. Chakwal. ♂. Wing 96 mm.

A common winter visitor from the second half of August until about the second week of March.

Saxicola isabellina. The Isabelline Chat.

Occurs, I believe, as a winter visitor, but I did not actually obtain a specimen.

Saxicola deserti. The Desert Chat.

906. 24.10.1913. Chakwal. ♂. Wing 89 mm.

1340. 13.3.1914. Dumman. ♀. „ 98 mm.

A common winter visitor from about the middle of October (but probably earlier) until the middle of March, staying a few days later than all the other species of Wheatear. In the riverain area it is more common than *S. capistrata*, but less numerous than it is in the Pabbi.

I was not able to ascertain (except in the case of *S. capistrata*, which occurs at Sardi) whether the Chats ascend the Salt Range or not. They probably do so.

[This is the eastern form, *S. d. atrogularis* Blyth. The March bird is in worn dress.—*C. B. T.*]

Saxicola chrysopygia. The Red-tailed Chat.

997 & 998. 5.2.1914. Sohawa. Wing 96 and 90 mm.

Noted in February as common in the broken ground at the base of the Salt Range near Sohawa.

[In rather worn plumage; no moult.—*C. B. T.*]

Ruticilla rufiventris. The Indian Redstart.

A common winter visitor from October (a single bird was seen as early as September 16) until about the end of March, by which time the majority have departed, although a few birds linger on until the end of April. A single individual was noticed as late as May 13.

Cyanecula suecica. The Red-spotted Blue-throat.

708. 2.5.1913. Jhelum. ♂. Wing 74 mm.

714. 7.5.1913. „ ♀. „ 71 mm.

901. 14.10.1913. „ ♂. „ 76 mm.

Occurs commonly on the spring migrations from March until the middle of May, and on the autumn migrations from the middle of September until the end of October. A few odd birds are to be met with during the winter.

[The males belong to the race *C.s. pallidogularis*.—C. B. T.]

Ianthia rufilata. The Red-flanked Bush-Robin.

965. 2.1.1914. Jhelum. ♀.

The only specimen met with by me was secured in the Rak.

Adelura cæruleicephala. The Blue-headed Robin.

A single bird which I believe was of this species was haunting a compound in the Civil Lines at Jhelum in January and February. The Blue-headed Robin is to be expected here as a winter visitor, as I found it common in Rawal Pindi in January and February, 1911.

Thamnobia cambaiensis. The Brown-backed Indian Robin.

744. 2.6.1913. Jhelum. ♀.

1321. 27.2.1914. „ ♂.

A common resident throughout the district, being most numerous on the stony slopes of the Salt Range. In this its habits differ from birds found in the central and southern Punjab, where it is the common familiar bird of gardens and cultivation.

Copsychus saularis. The Magpie-Robin.

A resident in small numbers, but apparently increasing from October to March by immigration, probably of those

birds which breed in the neighbouring foothills. I found a nest with five fresh eggs on July 5 in the District Board garden.

Merula bouboul. The Grey-winged Ouzel.

1316. 15.2.1914. Jhelum. Wing 136 mm.

1320. 26.2.1914. „ ♀ „ 144 mm.

A winter visitor in small numbers. Besides the above two specimens I saw a fine adult male on February 27 and a female on March 27, both in the immediate neighbourhood of Jhelum. Others were probably missed amongst the numbers of the next species.

[Iris dark brown, eye-rim yellow; feet mixed olive-brown and yellow; bill orange.—*C. B. T.*]

Merula atrigularis. The Black-throated Ouzel.

1311. 17.2.1914. Jhelum. ♀. Wing 133 mm.

A very common winter visitor, occurring in greatest numbers in the neighbourhood of Jhelum itself. The first bird was noted on January 8, and by the end of that month the species had become fairly plentiful. It reached its full numbers about the middle of February and started to decrease again towards the end of that month, the diminution in numbers continuing until the end of March. A few individuals were noted during the first half of April.

I believe I saw a single bird at Sohawa on September 14.

[Eyelids sage-green, gape yellow; feet steel-brown, claws darker; bill dark brown, base of lower mandible yellowish.—*C. B. T.*]

Petrophila cyanus. The Western Blue Rock-Thrush.

A winter visitor in small numbers to the rocky nullahs of the Pabbi tract, where an odd bird or two were noted from December 19 to March 2.

During the autumn migrations on September 4 I wounded but failed to secure what was undoubtedly a specimen of this species in a wood-yard at Jhelum.

Tharrhaleus atrigularis. The Black-throated Accentor.
Noted as common in flocks in December at Sardi by Captain C. H. T. Whitehead.

Uroloncha malabarica. The White-throated Munia.
A resident and most common in the Salt Range and the Pabbi tract; at Jhelum itself it is but seldom seen. Theobald (Nests & Eggs, ii. p. 136) gives the breeding-season in this district as May, August, September, October, and December.

Propasser grandis. The Red-mantled Rose-Finch.
Captain Whitehead shot a female of this species in December between Sardi and Lilla.

Carpodacus erythrinus. The Common Rose-Finch.
A common spring migrant, passing through from the second half of March until the second week of May. Not noted on the autumn migration. This species is very fond of mulberry fruit, and was often seen in the thickest parts of the Rak, frequenting the mulberry saplings which there form the undergrowth. The song is pleasing and freely uttered.

Acanthis fringillirostris. The Eastern Linnet.
1326. 2.3.1914. Dumman. ♂. Wing 84 mm.
1327, 1328. 3.3.1914. Dumman. ♂, ♂. Wing 84 &
84 mm.

A common winter visitor, probably from November until well into March. Captain Whitehead noted it at Sardi in December, so it probably occurs over the whole Salt Range, but it does not appear to visit the riverain area. I had many opportunities of observing them at Dumman in March, where they were common enough in small flocks or in parties of two or three individuals. These would often be noted flying overhead, attention being called by their twittering note, or settling at the tops of Shisham and Kikur trees. In the early mornings the males were singing freely at the tops of trees round the rest-house.

Hypacanthis spinoides. The Himalayan Greenfinch.

I saw what was almost certainly a Himalayan Greenfinch at Jhelum on January 9, but unfortunately was unable to secure it.

Gymnorhis flavicollis. The Yellow-throated Sparrow.

786. 13.7.1913. Jhelum. Imm. Wing 79 mm.

1361. 2.4.1914. „ ♂. „ 80 mm.

A very common summer visitor, arriving at the beginning of April. I have not fixed the time of its departure very accurately, but I think it is one of the first of our summer visitors to leave, all probably having gone before the middle of August. The species is found throughout the Salt Range.

[*Ad.* Iris dark brown; bill lead-black; feet plumbeous tinged with purple. The young, in nestling plumage, differs from the adult in lacking the yellow on the throat and the chestnut wing-patch, while the wing-bars are buffish white and the bill flesh-coloured underneath.—*C. B. T.*]

Passer domesticus. The House-Sparrow.

1309. 16.2.1914. Jhelum. ♀. Wing 71.5 mm.

Very common and resident, throughout the district, including the Salt Range.

[A very dull dark bird, but it was shot in the town; it is too dirty to determine the race.—*C. B. T.*]

Emberiza schoeniclus. The Reed-Bunting.

976. 17.1.1914. Jhelum. ♂. Wing 82 mm.

992, 993, 994. 30.1.1914. Jhelum. ♂, ♂, ♀. Wings 81, 81, 76 mm.

Small numbers were noted haunting some Iribi bushes by the river during January and February, and on the 4th of February a few were found roosting in the reed-grass by a small pond at Sohawa. It is probably a regular winter visitor in small numbers during January and February only.

[Iris dark brown; feet more dusky; bill horn-colour above,

steel-colour below. These pale birds are referable to *E. s. pallidior* Hartert, and Jhelum is an extension of its range, *vide* Vög. pal. Faun. p. 197.—*C. B. T.*]

Emberiza leucocephala. The Pine-Bunting.

1313. 18.2.1914. Jhelum. ♂. Wing 91·5 mm.

1329. 3.3.1914. Dumman. ♀. „ 85 mm.

The male was secured from a flock which appeared on the golf-course on February 18; the female was a solitary bird. In addition to these two occurrences, I saw what I took to be a number of these birds feeding in the fields near Dhodhi on April 10, 1913. The species is probably a regular spring visitor in small numbers. This appears to be an extension of its recorded range.

[Iris dark brown; tarsus pale brown, feet darker, claws blackish; bill horny, darker above. In worn plumage.—*C. B. T.*]

Emberiza stewarti. The White-capped Bunting.

Occurs in small parties as a visitor from the Himalayas. Noted on December 18 at the foot of the Salt Range near Parhi Darweza, and on April 10 near Jhelum.

Emberiza stracheyi. The Eastern Meadow-Bunting.

A winter visitor, usually met with in parties: I noted it from December until March, but it possibly occurs earlier.

Emberiza luteola. The Red-headed Bunting.

907. 25.10.1913. Chakwal. ♀. Wing, in moult.

Noted as common in the crops during the autumn migration at the end of August over the Chakwal plateau.

[Iris dark brown; feet pale brown; bill steel flesh-brown above, greenish tinge at gape. Just finishing a complete moult.—*C. B. T.*]

Emberiza striolata. The Striolated Bunting.

956. 18.12.1913. Parhi Darweza. ♀. Wing 75 mm.

958. 19.12.1913. „ ♂. „ 98·5 mm.

Very probably a resident, but I only met with it during the winter.

[Iris dark brown, orbicular sage; feet yellow-brown, claws blackish; bill blackish brown above, yellow below.—*C. B. T.*]

Note.—The notes on Buntings are very incomplete, as on many occasions I met parties which I was unable to identify, notably at Lilla in September.

Melophus melanicterus. The Crested Bunting. .

A pair of birds seen near the Rak on September 17 were almost certainly of this species.

Cotile diluta. The Pale Sand-Martin.

721. 10.5.1913. Jhelum. Imm. Wing 89 mm.

898. 11.10.1913. „ „ 98 mm.

1346. 18.3.1914. „ ♂. „ 89 mm.

1349. 22.3.1914. „ ♀. „ 95.5 mm.

Status not quite certain, but possibly a resident, though there is some ground for supposing that it disappears from July to September during the rains. They breed in February and March along the river-banks and are seldom seen away from the river.

[Mr. Whistler notes of 898 that it was shot from a number of Sand-Martins *of two sizes* flying about the river in company with a number of *Hirundo smithii*. This specimen is a juvenile just commencing a full moult, and has longer wings and tail than any other Jhelum specimens sent. I think it may be an example of *C. diluta*.

Dr. Hartert (Vög. pal. Faun. p. 813) gives the measurements of the wing of *C. diluta* as “♂ ♀ 100–105 mm.,” from *summer visitors* breeding on the R. Lena. This race was described by Sharpe and Wyatt from specimens from Chimkent and Tashkent in Turkestan. Breeding-birds from the Punjab, however, I find only measure, ♂ 95–98, ♀ 88–89 mm., and therefore I think it is justifiable to separate these (and in this Dr. Hartert, who has kindly examined the specimens, agrees with me), which are apparently a *resident* short-winged race, for which I propose the name

RIPARIA RIPARIA INDICA, subsp. nov.

Description. Similar to *R. r. diluta*, but has shorter wings and tail, the latter, perhaps, somewhat less forked. Differs from *R. r. littoralis* in its rather paler upper parts and in having the pectoral band paler, less distinctly marked, and sometimes almost wanting.

Wing: ♂ 95-98 mm., ♀ 88-89 mm. Tail 40-43 mm. Tarsus 10 mm. Bill from edge of forehead-feathers about 6 mm. Feet brownish; bill blackish.

Type-locality. Punjab, India (Jhelum and Ferozepur).

Type-specimen. H. Whistler coll. No. 1349, ♂. Jhelum, 22.3.1914. From a breeding-colony. Wing 95; tail 43; tarsus 10; bill 6 mm.; central tail-feather only 3 mm. shorter than the laterals.

March specimens are slightly worn; 721 is a juvenile, and has faint rusty-grey edges to the upper parts and pale rusty edges and tips to all the coverts and tertials.—*C. B. T.*]

Ptyonoprogne rupestris. The Crag-Martin.

A few were noted near Chakwal on April 13, 1913, and one or two were seen at the base of the Salt Range, near Sohawa, on February 4, 1914. In addition to the above, I believe I saw some flying in company with *H. rustica* at Jhelum on March 31, 1914. No specimen obtained.

Hirundo rustica. The Swallow.

887. 6.10.1913. Jhelum. Wing 118 mm. (worn).

888. " " " 122 mm. "

A spring and autumn passage-migrant in considerable numbers. The spring migration was at its height in March and April, but a few birds were seen from the 1st of February onwards. The autumn migration passed through in the first half of October (and probably the latter half of September, but I was away then), a few birds being seen in July and August.

[Both these specimens, which are adult, have nearly finished a complete moult at a period when in England the species has not begun to moult. These belong to the typical race.—*C. B. T.*]

Hirundo smithii. The Wire-tailed Swallow.

A summer resident, arriving in April, breeding from May to August, and departing by the end of the third week in October. Probably also a passage migrant in fair numbers. They are doubled-brooded, and some pairs probably nest even a third time.

Hirundo fluvicola. The Indian Cliff-Swallow.

669. 7.4.1913. Sohawa. ♂. Wing 96 mm.

767. 21.6.1913. Jhelum. „ 98 mm.

782. 9.7.1913. „ „ 90 mm.

Noted in some numbers in April, June, and July. Status uncertain, but possibly a passage migrant. A few colonies may breed in the Salt Range.

[Iris dark brown; bill and feet black. 782 has just commenced moult of body and wings.—*C. B. T.*]

Hirundo erythropygia. Sykes' Striated Swallow.

1364. 6.4.1914. Jhelum. ♂. Wing 117 mm.

1365. 8.4.1914. „ ♂. „ 115 mm.

1366. „ „ ♂. „ 112 mm.

Breeds chiefly in the Salt Range, in small numbers, from May to July. A well-marked passage of these birds at Jhelum was noticed in February and April, and probably a similar passage takes place in August and September, as it does in the neighbouring district of Rawal Pindi. More observations are needed to settle its exact status, and also to see whether all the Striated Swallows that occur in this district belong to this species or not.

[Iris and feet dark brown; bill black. These belong to the race described by Seebohm as *H. rufula scullii*.—*C. B. T.*]

Motacilla alba. The White Wagtail.

703. 2.5.1913. Jhelum. ♀. Wing 84 mm.

704. „ „ Sex? „ 88 mm.

893. 9.10.1913. „ ♂. „ 92 mm.

1314. 19.2.1914. „ ♂. „ 91 mm.

1347. 20.3.1914. „ ♀. „ 88 mm.

1367. 8.4.1914. Jhelum. Wing 90 mm.

1378. 12.4.1914. „ ♀. „ 82 mm.

This is the most common Wagtail of the district, and may be met with from August until about the middle of May. It occurs in greatest numbers as a spring and autumn passage-migrant from March until May, and again from August until October, but is also sufficiently general and common as a winter resident.

[1347 and 1367 belong to the well-marked race *M. a. dukhunensis* of Sykes, which shows nearly as much white on the tertials, greater and median coverts, as does *M. personata*. Both specimens are in freshly moulted plumage.

The rest are typical *M. alba alba*, and therefore its range as a passage migrant and winter visitor must be extended to the Punjab (*cf.* Hartert, Vög. pal. Faun. p. 303). The April and May specimens are in full summer plumage and in fresh body-feather. Some at least, perhaps all, have recently moulted the tertials, and two specimens appear to have recently moulted the central tail-feathers. Some females have the chin and throat so narrowly edged with black in spring that much of the white bases of the feathers show, a condition I have also noted in British specimens.—*C. B. T.*]

***Motacilla personata.* The Masked Wagtail.**

868. 17.9.1913. Jhelum. ♂. Wing 97 mm.

892. 9.10.1913. „ „ 95 mm.

1377. 12.4.1914. „ ♀. „ 89 mm.

1379. 13.4.1914. „ ♀. „ 89 mm.

A common species found usually in company with the White Wagtail, but only about in the proportion of one to ten; on two or three days about the middle of March, however, the Masked Wagtail appeared to be in the majority. Its status appears to be exactly the same as that of the White Wagtail, except that it perhaps arrives a few days later and leaves a few days earlier.

[1379 has a white line running from the base of the bill to the side of the neck cutting off the black of the throat from that of the ear-coverts—a variation towards what is found in *M. p. subpersonata*.—*C. B. T.*]

Motacilla maderaspatensis. The Large Pied Wagtail.

774. 1.7.1913. Chua Saidan Shah. ♀. Wing 94 mm.

960. 19.12.1913. Parhi. ♂. Wing 99 mm.

Breeds in the Salt Range in July, and is probably resident, though very seldom met with.

Motacilla melanope. The Grey Wagtail.

959. 19.12.1913. Parhi. ♂. Wing 88 mm.; tail 95 mm.

A winter visitor in small numbers, noted from September until April.

[Iris dark brown; feet brown, claws and bill black, base of lower mandible steel-colour. The distinction given by Dr. Hartert (Vög. pal. Faun. p. 300), I find, does not hold good in this specimen, viz. the relative distribution of the brown colour on the shafts and inner webs of the three outer tail-feathers, while in other Punjab specimens it is very variable.—*C. B. T.*]

Motacilla borealis. Grey-headed Wagtail.

679. 18.4.1913. Jhelum. ♀. Wing 76 mm.

716. 10.5.1913. „ ♀. „ 79 mm.

717. „ „ ♀. „ 80 mm.

718. „ „ ♀? „ 82 mm.

729. 22 5.1913. „ ♀. „ 76 mm.

752. 6.6.1913. „ ♀. „ 74 mm. (worn).

866. 17.9.1913. „ „ 78 mm.

A very abundant spring passage-migrant, appearing in March and leaving in May; during the first half of May it was, perhaps, the most numerous species in the flocks of mixed Wagtails which were commonly to be found on the grass-lands (as, for example, the golf-course) by the river. A single bird (752) was observed in June. On the autumn passage it would seem to be less common, and I only definitely identified it in September, though it was doubtless represented in the flocks of Yellow Wagtails which were seen in August and October.

The great flocks of Yellow Wagtails were a feature of my year in Jhelum district, and the River Jhelum would seem to be a well-marked migration-route, judging from

the numbers which frequented the grass-lands along the river-banks. They started to appear about March, and reached their full numbers about the beginning of May, leaving by the end of that month. The autumn migration started in August and reached its full height in September, comparatively few birds staying into October. The total number of birds passing through in autumn would appear to be much less than in spring.

[718 is a typical male; 752 and 716 have dark slate-coloured heads and ear-coverts, the latter with an indication of an eye-streak; 729, 717, and 866 have rather browner heads and ear-coverts and a distinct eye-streak; all are more or less spotted or washed with olive on the lower throat, and have the underparts yellow. 679 has also a dark slate head and ear-coverts, with a well-marked superciliary streak and throat-mottling, but with much less yellow on the underparts. Whether this variation in females is a question of age, or whether there is another race represented amongst these, I cannot say, but 866 I regard as an adult autumn female. All spring birds are in rather worn plumage.—*C. B. T.*]

Motacilla beema. The Indian Blue-headed Wagtail.

678.	18.4.1913.	Jhelum.	♂.	Wing	82 mm.
706.	2.5.1913.	„	♀?	„	74 mm.
707.	2.5.1913.	„	♂.	„	79 mm.
895.	11.10.1913.	„	♂.	„	80 mm.
1344.	18.3.1914.	„	♂.	„	80 mm.

A common spring and autumn passage-migrant, occurring in flocks in company with other Wagtails from March until May and from August until October.

[1344 has the central tail-feathers and tertials in quill, while moult of the greater and median coverts has commenced, as well as of the body-feathers; the old feathers of the head are brown. 678 is in full fresh plumage, and appears to have moulted in the same manner, all the coverts being fresh except the primary and outer greater coverts. 707 is similar, only a shade darker on the ear-coverts. 895 is probably an adult male in winter plumage, and

merely differs from the spring male in having a darker blue head and browner back and an indication of throat-spots.—*C. B. T.*]

Motacilla flava leucocephala. The White-headed Wagtail.
705. 2.5.1913. Jhelum. ♂. Wing 82 mm.

[In fresh plumage; whole of head, cheeks, ear-coverts, and chin pure white; a band of pale blue-grey separates the white of the head from the yellow-green mantle, otherwise like *M. beema*.

This Wagtail was described by Przewalski (Zapeski Imper. Akad. Nauk. St. Petersburg, lv. 1887, p. 85; also 'Ibis,' 1887, p. 409) from specimens obtained during spring migration on the River Irtysh and in the Altai over 1000 miles north-east of Jhelum. The breeding and winter quarters are unknown, and only a very few specimens are known. This is the first record from India (see also Bull. B. O. C. xxxv. 1914, pp. 59-60).—*C. B. T.*]

Motacilla citreola. The Yellow-headed Wagtail.
1332. 6.3.1914. Chakwal. ♂. Wing 85 mm.
1345. 18.3.1914. Jhelum. ♂. „ 80 mm.

[Feet and bill black. 1332 is in freshly moulted body-plumage, while the tertials and central tail-feathers, greater and median coverts have every appearance of being newly acquired. 1345 is in full moult, new yellow feathers appearing all over the old brown head and old white chin and throat; besides the body-feathers, the central tail-feathers, and the tertials, all the median and greater coverts and some of the lesser coverts are in quill.—*C. B. T.*]

Motacilla citreoloides. Hodgson's Yellow-headed Wagtail.
670. 7.4.1913. Sohawa. Wing 82 mm.
715. 10.5.1913. Jhelum. ♂. „ 81 mm.
749. 4.6.1913. „ ♂. „ 83 mm.
805. 6.8.1913. „ „ 78 mm.
845. 5.9.1913. „ „ 76 mm.
867. 17.9.1913. „ „ 82 mm.

Yellow-headed Wagtails occur commonly from March (a few arriving in February) until well into May, but I have had to lump both races together, owing to the difficulty of

separating them in the field. *Motacilla citreola* was definitely identified as early as February 4, and as late as May 13. *M. citreoloides* was definitely identified first on March 6, while of two stragglers seen on June 4, one obtained was referred to that race. They occur in the mixed flocks of Wagtails, but are often found separately, and then generally in grass and reeds round small ponds. The species also is a very persistent feeder on the extreme edge of the river, frequenting the broken lumps of earth which line the higher banks marking the progress of erosion; this is also a feeding-ground beloved of *M. alba* and *M. personata*, but not of *M. beema* and *M. borealis*. Both forms of Yellow-headed Wagtail probably occur on the autumn migration.

[715 is a fully adult male; the other two spring birds have the hind-neck black, the back grey mottled with black, and I suppose them to be birds one year old; all are in fresh-moulted body-feather, and one appears to have recently moulted the tertials, one has not, while the third has moulted the longest tertial only.

The three autumn birds I place under this species tentatively; they all have brown backs, grey rumps, and broad white superciliaries, and are mottled on the lower throat with brown; one is tinged with yellow on the belly, another is pure white, while the third is tinged with pale buff on all the underparts. They would appear to be birds of the year, and therefore notoriously difficult to name. There seems to be rather a lack of good material for identifying young Wagtails, and until we can see a series of first winter birds shot in their breeding-haunts before they migrate, and after they have moulted from the juvenile dress, the difficulty will remain. The matter is further complicated by the fact that *M. citreoloides*, and perhaps some others, takes two years to become adult.—C. B. 7.]

Anthus trivialis. The Tree-Pipit.

853. 10.9.1913. Sardi. Wing 84 mm.

858. 12.9.1913. „ „ 90 mm.

881. 17.9.1913. Jhelum. ♂.

A spring and autumn passage-migrant in March–April

and September–October, usually met with in small parties. It may be of interest to note here that in September, when I went to Hazara, north-west Himalayas, for ten days' leave, I met with similar migrating parties there as high as 10,000 feet at the same time as the species was passing through the Jhelum district.

[Iris dark brown ; feet pale flesh-coloured ; bill dark brown above, flesh-coloured below.—*C. B. T.*]

Anthus similis. The Brown Rock-Pipit.

736. 27.5.1913. Dalur, Salt Range. ♂. Wing 100 mm.

859. 12.9.1913. Sardi, Salt Range. Wing 99 mm.

1341. 14.3.1914. Parhi. ♂.

Common and probably resident in the Salt Range, spreading over the district in winter. An unfinished nest found at Dalur on May 27 appeared to belong to this species.

[Iris dark brown ; feet pale flesh ; bill dark brown, base of lower mandible livid.

The Brown Rock-Pipits are now known as *Anthus leucophrys* Vieillot, and the specimens which Mr. Whistler obtained in the Salt Range belong to the race *jerdoni* Finsch, the darker *similis* being found in southern India.—*C. B. T.*]

Anthus rufulus. The Indian Pipit.

741. 31.5.1913. Jhelum. ♂. Wing 83 mm.

1352. 25.3.1914. „ ♂.

Breeds in April. Not uncommon, but status uncertain.

[Iris hazel ; feet yellow-brown ; bill dark horn above, flesh-coloured below.—*C. B. T.*]

Anthus campestris. The Tawny Pipit.

849. 8.9.1913. Lilla. Wing 90 mm.

1334. 10.3.1914. Dumman. ♂. Wing 89 mm.

Not known to breed in the district, and probably a winter visitor or passage migrant only.

[Iris dark brown ; feet brownish flesh-coloured ; bill flesh-coloured, culmen and tip blackish. The spring bird is moulting the body-feathers and tertials, the autumn one is completing a full moult.—*C. B. T.*]

Anthus spinoletta blakistoni. The Central Asian Water-Pipit.

941. 3.12.1913. Jhelum. Wing 83·5 mm.

943. 7.12.1913. Chakwal. ♂.

946. 8.12.1913. „ ♂. Wing 89 mm.

Noted in some numbers in December in flocks on the golf-course by the river and about the tank at Chakwal.

[Iris and feet dark brown, soles yellowish; bill brown. base of lower mandible yellowish. These are typical *A. s. blakistoni*.—*C. B. T.*]

Alauda arvensis. The Sky-Lark.

952. 16.12.1913. Parhi. Wing 119 mm.

An abundant winter visitor, occurring in large flocks which arrive about October and leave towards the end of March.

[Iris light brown; tarsi brown, claws black; bill horn-colour, darker along the culmen. This specimen I refer to *A. arvensis schach* Ehmeke, from its very pale sandy upper parts, though sufficient material is not at hand to say whether this race is really separable from *A. a. cinerascens* Ehmeke.—*C. B. T.*]

Alauda gulgula. The Indian Sky-Lark.

852. 10.9.1913. Sardi. ♂.

Status uncertain, but it is probably a resident, reinforced by winter immigration. Breeds in April.

Calandrella brachydactyla. The Short-toed Lark.

953. 16.12.1913. Parhi. ♀. Wing 90 mm.

1336. 11.3.1914. Dumman. ♂. „ 89·5 mm.

A winter visitor, occurring abundantly in large flocks; first noted on October 13, and still numerous in the middle of March.

[Iris brown; feet pale brown; bill horn-colour, dusky along the culmen. These specimens belong to the greyer eastern form, *C. b. longipennis*.—*C. B. T.*]

Alaudula adamsi. The Indus Sand-Lark.

722. 11.5.1913. Jhelum. ♀. Wing 78 mm.

780. 5.7.1913. „ Imm. „ 80 mm.

840. 4.9.1913. „ ♂.

972, 973. 10.1.1914. Jhelum. ♂, sex?

This is the common Lark of the river-bed, where it is resident, breeding on the sand-banks and islands of the river in April, and collecting in flocks in winter. These flocks appear to move about but little, as I observed one frequenting the same patch of ground by the river from January 10 until February 19. The species is an excellent mimic; one individual while singing was heard to give an exact imitation of the call of *Sarcogrammus indicus* as heard from a distance, while the alarm-call with which *Totanus ochropus* springs into flight was several times introduced into the song.

From Hume's 'Nests & Eggs of Indian Birds' (ed. 2, vol. ii. p. 226) it appears that the eggs of this Lark were first described by Captain Cock, from Jhelum.

[Iris dark brown; feet brown; bill dusky horn-colour above, flesh-brown below. 780, which Mr. Whistler thinks, by the soft yellow gape and incomplete ossification of the skull, to be a bird of the year, is making a complete moult.—C. B. T.]

Galerita cristata. The Crested Lark.

		Wing.	Bill from edge of forehead feathers.
860. 12.9.1913.	Sardi. ♂.	102	16 mm.
954. 16.12.1913.	Parhi.	98	17 mm.
955. „ „	„	105	16 mm.
961. 19.12.1913.	„	104	17 mm.

A common resident, said to breed from the fourth week of March until May. It is found everywhere, including the river-valley and the same ground as the last species, but is most numerous in the Salt Range and the broken ground of the Chakwal plateau.

[Iris light brown; feet horn-colour; bill horn-brown. These specimens belong to the race *G. c. chendoola* Franklin. 860 has just completed a full moult.—C. B. T.]

Ammomanes phœnicuroides. The Desert Finch-Lark.

Wing. Bill from base.

673.	10.4.1913.	Dumman.	♂.	101	14 mm.
962.	19.12.1913.	Parhi.	♀.	99	12.5 mm.
1330.	3.3.1914.	Dumman.	♀.	96	12.5 mm.

Resident and common, but confined to the nullahs and rocky ground of the Salt Range and the Chakwal Plateau.

[Iris and tarsi pale brown; feet darker, claws blackish; bill brown, base of lower mandible yellow. All are in worn plumage.—*C. B. T.*]

Pyrrhulauda grisea. The Ashy-crowned Finch-Lark.

851. 10.9.1913. Sardi. ♂. Wing 75 mm.

880. „ „ Juv. Nestling.

The nestling with parent bird was obtained from a nest at Sardi, in the Salt Range, where the species was common. The nest was of neat construction, slight and cup-shaped, on the open ground by a tuft of grass and small stones; there were also a few about Lilla (on the plain exactly below Sardi) at that date. I did not again visit that neighbourhood, and only met with the species elsewhere at Jhelum, where, at the end of March and beginning of April, a couple of flights and a pair were noted on migration.

[*Adult.* Iris brown; feet pinkish brown; bill pale bluish grey. The nestling shows the usual dark pattern of juvenile plumage, having brown feathers on the upper parts with creamy-buff bases and tips; the wing-feathers are edged and tipped with warmer buff; underparts creamy buff; what little nestling-down remains is buffish white.—*C. B. T.*]

Pyrrhulauda melanauchen. Black-crowned Finch-Lark.

Captain Whitehead met with this species in fair numbers in December in the fields some four miles north of Lilla, and obtained a male for verification. This was some 300 miles north-west of the previously recorded range of the species (though I have since obtained the species and found it in small numbers at Chautala, Hissar district). The exact status of these two small Larks in the Punjab requires working out.

Arachnecthra asiatica. The Purple Sun-bird.

A very common summer resident, arriving during the first half of March and leaving towards the end of August and the beginning of September, the last individual being noted on September 17. Breeds commonly from April to June. Occurs throughout the Salt Range.

Dendrocopus sindianus. The Sind Pied Woodpecker.

Resident and fairly common in the Salt Range and those parts of the district which lie north of it. Apparently it does not occur south of the Salt Range, which is here its boundary.

Liopicus mahrattensis. The Yellow-fronted Pied Woodpecker.

674. 11.4.1913. Dhodha. ♂. Wing 106 mm.

A common resident throughout the district and in the Salt Range.

[Iris claret-colour; feet very dark plumbeous; bill plumbeous grey, darker on culmen and tip.—*C. B. T.*]

Brachypternus aurantius. The Golden-backed Woodpecker.

A common resident in the district south of the Salt Range, which is its northernmost limit. It thus occurs in those parts of the district where *D. sindianus* does not, the Salt Range forming the boundary. I found a nest-hole being excavated early in April, and was brought a newly-fledged young bird on July 4.

Iynx torquilla. The Common Wryneck.

843. 4.9.1913. Jhelum. Wing 88 mm.

1324. 1.3.1914. Chakwal. ♂. Wing 87 mm.

A spring and autumn passage-migrant, noted on April 11 (2), May 9, and September 4, 1913, and March 1, 1914.

[These specimens are much paler above, especially on the scapulars and rump, than British specimens in my collection. Dr. Hartert, who kindly examined them, tells me there are equally pale specimens at Tring from Sweden, East Prussia,

and Russia, and dark specimens resembling the British ones are to hand from Norway, Sweden, and Germany, so that it would appear to be a case of individual variation.—*C. B. T.*]

Megalæma marshallorum. The Great Himalayan Barbet.
1360. 1.4.1913. Jhelum. ♀. Wing 139 mm.

This specimen, shot in my compound, was the only one met with. It is a rare straggler from the Himalayas.

[Iris dark brown, eyelid plumbeous; feet olive-green, claws lead-black; bill, basal half bright yellow, rest of lower mandible and median part of upper lead-black.—*C. B. T.*]

Xantholæma hæmatocephala. The Crimson-breasted Barbet.

Occurrence doubtful, but I heard what was perhaps its call on April 4 and July 16, 1913. It is common in the Gujranwala district a little further south, but does not occur in the Rawal Pindi district.

Coracias indica. The Indian Roller.

A common resident, probably also partly migratory, as it becomes less noticeable from about the second half of October until the middle of February. Nests chiefly in May and June.

Coracias garrula. The European Roller.

A not uncommon summer visitor, noted only in May and June. It is mostly confined to the nullahs of the broken country north of the Salt Range (and there it possibly breeds), but I saw one flying across the Jhelum River some miles below Jhelum on June 8.

Merops viridis. The Common Indian Bee-eater.

686. 21.4.1913. Jhelum. ♂. Wing 96 mm.

A very numerous summer resident, arriving during the first half of March (first noted on the 3rd, and general by the 15th) and leaving in October, very few remaining until the middle of that month. An individual was haunting the District Board garden until well into December. It occurs over the Salt Range.

[Iris red ; feet purplish brown ; bill black. This appears to belong to the race *M. v. beludschicus*.—*C. B. T.*]

Merops philippinus. The Blue-tailed Bee-eater.

702. 3.4.1913. Jhelum. ♂. Wing 129 mm.

753. 7.6.1913. „ ♂. „ 135 mm.

783. 9.7.1913 „ ♂. „ 138 mm.

A common summer resident, found throughout the district including the Salt Range, but most generally observed in the neighbourhood of water. It arrives in April, being first seen on the 6th, and is abundant by the end of the month ; it leaves again in September. However, I saw two flights, apparently of this species, in October, namely, on the 4th and the 11th.

Merops persicus. The Blue-cheeked Bee-eater.

847. 7.9.1913. Lilla. Imm. Wing 132 mm.

Several immature birds of this species were noticed about Lilla on September 7.

[Iris vinous brown ; feet dark plumbeous ; bill black. Just commenced the body-moult.—*C. B. T.*]

Ceryle varia. The Indian Pied Kingfisher.

724. 11.5.1913. Jhelum. Wing 139 mm.

A common resident, met with almost invariably in pairs along the river, where it breeds in the banks. I dug out six eggs from a burrow on February 8. Many nests suffer from the erosion of the banks ; this seems to be the only check on their increase.

[This is the *C. rudis leucomelanura* Reichenb., with the basal half of the tail pure white and the underparts with roundish black spots.—*C. B. T.*]

Alcedo ispida. The Common Kingfisher.

772. 1.7.1913. Chua Saidan Shah. ♀. Wing 75 mm.

Met with occasionally throughout the year, both in the Salt Range and by the Jhelum River.

[Iris dark brown ; feet orange-red, claws black ; bill black above, dusky flesh-colour below. Had recently laid. This belongs to the form *A. ispida bengalensis*.—*C. B. T.*]

Halcyon smyrnensis. The White-breasted Kingfisher.

Resident and fairly common throughout the district, being probably most numerous in the gardens of the Salt Range.

Upupa epops. The European Hoopoe.

844. 5.9.1913. Jhelum. ♂. Wing 148 mm.

It is difficult to work out the status of this bird, but it would seem to be resident in small numbers, a winter visitor in small numbers, and a passage migrant in February and March, and from August to October. I noticed a most marked migration of these birds on the 24th and 28th of August, on which dates I had occasion to travel from Mandra to Chakwal. They were then, and especially on the latter date, most numerous along the road in small parties—and this is ground where, in the summer, I would usually see only one or two individuals, and in the winter some half dozen in the whole 39 miles. *Upupa indica* was not noted, but it probably occurs occasionally.

[Iris dark brown; feet lead-brown; bill flesh-coloured at base, darkening to black.

A young bird moulting body-feathers; it appears to belong to the typical race.—*C. B. T.*]

Cypselus melba. The Alpine Swift.

A spring passage-migrant in March and April, and an autumn passage-migrant in August and September.

Cypselus apus. The European Swift.

Only noted on the autumn migrations in very small numbers in August and September.

Cypselus affinis. The Common Indian Swift.

Common, and noted in every month save December and January; it becomes scarcer in October and November, and but few birds were noted in February. Breeds commonly about March and April.

Caprimulgus europæus. The European Nightjar.

734. 26.5.1913. Dalur. ♂. Wing 181.5 mm.

This specimen which had the testes greatly enlarged and

was probably breeding, was the only Nightjar actually shot by me in the district.

I flushed a Nightjar (sp.?) in the Rak on 2nd June. No other specimens were seen in the district, but I fancy that some species will be found common in the Salt Range.

[Iris dark brown, feet lead-colour; claws black; bill plumbeous, black at tip.

This specimen is typical *C. europæus univini*, and if, as seems almost certain, it was breeding, it would extend the breeding-range of this race a good deal farther south than that given by Dr. Hartert (Vög. pal. Faun. vol. ii. p. 849). — *C. B. T.*]

Cuculus canorus. The Cuckoo.

709. 6.5.1913. Jhelum. ♂ ad. Wing 220 mm.

727. 15.5.1913. „ ♂ ad. „ 225 mm.

838. 31.8.1913. „ ♀ imm. „ 210 mm.

A fairly common spring and autumn passage-migrant in April, May, August, and September; but it is possible that an odd bird or two may stay to breed, as on June 26 I saw what was evidently a Cuckoo being mobbed by a pair of Tailor-birds. The earliest bird was noted calling on April 4.

[*Adult.* Iris, eyelid, and feet orange; claws brown; bill black above and at tip, a patch in front of nostrils and basal half of lower mandible olive-green, gape orange.

Neither these specimens, nor others from elsewhere in the Punjab, have the characters of *C. c. telephonus*, all being very coarsely marked with black cross-bands on the lower parts and under tail-coverts; neither does the grey of the throat nor length of wing differ from European examples, and therefore, I must assign Mr. Whistler's specimens to the typical form which, according to Dr. Hartert, does not go farther east than Persia (*cf.* Vög. pal. Faun. ii. p. 915). The autumn bird shows the rufous phase of plumage, and has the iris brown, eye-rim yellow, and lids plumbeous. — *C. B. T.*]

Coccytes jacobinus. The Pied Crested Cuckoo.

759. 15.6.1913. Jhelum. ♂. Wing 150 mm.

760. „ „ ♂. „ 153 mm.

Not common, noted as follows :—June 15, three birds seen, of which two were shot; August 28, a single individual seen on the Chakwal tonga-road; August 31, one seen near the Rak; September 4, one seen near the Rak. In addition to the above, I believe I heard one calling at Chua Saidan Shah on June 30. In Hume's 'Nests and Eggs' (2nd edit.), vol. ii. p. 388, it is stated to breed in August in the Salt Range.

[Iris dark brown; bill black; tarsi lead-grey, feet darker. Hairy caterpillars in gizzard.—C. B. T.]

Eudynamis honorata. The Indian Koel.

695. 27.4.1913. Jhelum. ♀. Wing 194 mm.

746. 2.6.1913. „ ♂. „ 190 mm.

788. 16.7.1913. „ ♀. „ 192 mm.

816. 13.8.1913. „ Juv. „ not grown.

827. 20.8.1913. „ ♀ juv. „ not grown.

A summer visitor, arriving in April (first heard on the 11th), but not becoming common until well into May. About September the species begins to depart, and the last bird noted was seen on October 6. I obtained eight eggs in all from nests of *Corvus splendens* between June 26 and July 12, of which two were in one nest and three in another. In the latter instance there were no Crow's eggs left in the nest.

[*Male*. Iris red; feet plumbeous olive; bill plumbeous grey. Wild figs in gizzard.

827 is moulting out of the juvenile dress, which differs from that of the adult female in having the upper parts brownish black with only slight gloss; brown bars replace the white bars on the upper tail-coverts and wings, and the wing-coverts are tipped with white; the underparts similar to the adult female, but the chin and throat black. 816, which probably came from the same nest, is evidently a juvenile male, and differs from the adult male only in being

less glossy and rather a rustier black. Both birds are in full body-moult.—*C. B. T.*]

Centropus sinensis. The Common Coucal.

817. 13.8.1913. Jhelum. ♀. Wing 220 mm.

As far as I know, this species only occurs in one place in the district, namely, in the Rak at Jhelum, where a few pairs are resident. In January I saw one on several days sitting in a slight stick nest, possibly an old Crow's, at the top of a willow sapling, but apparently no eggs were laid.

[Iris crimson; feet and bill black. Ovary contained an egg the size of a Swallow's. Frog and beetle remains and a noctuid chrysalis in gizzard.—*C. B. T.*]

Palæornis nepalensis. The Large Indian Paroquet.

A common resident, breeding in March and April. Large numbers collect to roost in the Rak.

Palæornis torquatus. The Rose-ringed Paroquet.

1301. 12.2.1914. Jhelum. ♀. Wing 178 mm.

A very common resident. Large numbers roost in the Rak.

[Iris yellow, inner ring grey; eye-rim orange; feet sage, claws plumbeous; cere dull yellow, broad; bill purplish red, tip and lower mandible black.—*C. B. T.*]

Palæornis cyanocephalus. The Western Blossom-headed Paroquet.

936. 28.11.1913. Jhelum. ♂. Wing 144 mm.

983. 23.1.1914. „ ♂. „ 147 mm.

995. 30.1.1914. „ ♀. „ 143 mm.

A not uncommon winter visitor from the second half of November until February. Also noted during the autumn migrations, when a single male was observed on the 1st of October, and a party of five on the 2nd.

[*Male.* Iris whitish yellow with grey inner ring; feet plumbeous olive-green, claws grey; bill, upper mandible, dull orange, lower mandible black; cere dirty olive-green.

Female. Upper mandible yellow.—*C. B. T.*]

Strix flammea. The Barn-Owl.

On October 31 I was shown a living specimen which had been caught in Jhelum city.

Asio accipitrinus. The Short-eared Owl.

A single specimen seen on November 1, when it was circling in the air for a long time in the afternoon, being mobbed by Crows. What was almost certainly the same specimen was flushed on the golf-course on November 3.

Ketupa zeylonensis. The Brown Fish-Owl.

920. 4.11.1913. Jhelum. ♂.

This specimen was shot in the Rak, where I saw it before on October 10.

Bubo bengalensis. The Rock Horned Owl.

Probably resident and fairly common in the Salt Range.

Several Owls which appeared referable to this species and not *B. coromandus*, were noted about Jhelum during the winter in the Rak, including one that used to sleep in a peepul-tree in my compound. One was flushed from under a small tamarisk bush on an island of the river on February 8.

Bubo coromandus. The Dusky Horned Owl.

A few pairs are resident in the Rak at Jhelum, where I found a nest containing two eggs on January 4. They were often heard calling an hour or two before sunset. For a long time I was puzzled as to their food-supply in the thick jungle of the Rak, but one evening during daylight I flushed an owl carrying a black object which appeared to be part of a crow. This incident, combined with the fact that the Rak is littered with portions of defunct crows, suggest that these Owls find an easy living amongst the hordes of Crows, Mynahs and Starlings which roost nightly in the Rak.

Athene brama. The Spotted Owlet.

677. 16.4.1913. Jhelum. ♂. Wing 164 mm.

A common resident, occurring throughout the district, including the Salt Range.

[Iris yellow ; feet dirty greenish yellow ; claws lead-black ; bill dirty lead-green ; cere much darker, eyelid plumbeous.

This belongs to the lighter race, *A. b. tarayensis*, of Hodgson.—*C. B. T.*]

Vultur monachus. The Cinereous Vulture.

A winter visitor in small numbers, a few being noticed on various dates from November 17 until April 10. The largest number seen in one day was five. The weight of a specimen shot on November 27 (sex not ascertained) was $14\frac{1}{2}$ lbs.

Otogyps calvus. The Black or King Vulture.

Moderately common, and to be met with throughout the year, although there are decidedly fewer about in summer, when many probably go up to the Hill Sanatoria. They breed about March, but a nestling only a day or two old was brought to me on April 15.

Gyps fulvus. The Griffon Vulture.

Common and to be met with at all times of the year, although it does not appear to breed in the district. This is the common Vulture of the Salt Range, where numbers may be seen about the sheer hill-sides. Near Sohawa there is a small precipice which shows as a white patch on the hill-side for many miles, due to the excreta of the Griffons, which use it as a resting-place. I was informed by a native officer who lives in a neighbouring village, that he could remember the patch from the days of his boyhood.

Pseudogyps bengalensis. The Indian White-backed Vulture.

The commonest Vulture of the district ; this species may be considered the Vulture of the plains, whereas the last is more truly the Vulture of the Salt Range, although both species of course may be met anywhere collected together in numbers. I did not find any breeding-colony, but Theobald (Hume's 'Nests and Eggs,' 2nd ed. vol. iii. p. 206) records the species as breeding in March near Pind Dadan Khan and Katas.

Neophron percnopterus. The Egyptian Vulture.

Resident and very numerous, breeding commonly in March and April on ledges of small cliffs in the broken country all round the Salt Range. Theobald's record of the breeding of *Neophron ginginianus* near Pind Dadan Khan and Katas (Hume's 'Nests and Eggs,' 2nd ed. vol. iii. p. 214) must refer to this race.

Gypaëtus barbatus. The Bearded Vulture or Lammergeyer.

I noted two of these fine birds near Chua Saidan Shah on June 30, and two near Sohawa on February 4; but, unfortunately, I did not spend enough time in the Salt Range to make out the bird's exact status, whether it breeds in the Jhelum portion of the hills or not.

Aquila bifasciata. The Steppe Eagle.

A pair of these huge Eagles were met with sitting on a wide cultivated plain on November 8. One was shot and found to weigh $6\frac{3}{4}$ lbs. (sex not ascertained). It was in immature plumage, and so extraordinarily fat that I failed to preserve it. On January 22 in the Rak I noted two Eagles that were probably of this species.

Aquila vindhiana. The Indian Tawny Eagle.

905. 21.10.1913. Jhelum. ♂.

969. 6.1.1914. „ ♀.

1300. 9.2.1914. „ ♀.

1325. 1.3.1914. „ ♀.

This is the common Eagle of the district, and may be found at all times of the year, though it is probably partly migratory, its numbers undergoing an increase in winter, *i. e.* the breeding-season. Nests were found on the following dates:—January 5, c/2 slightly incubated; January 6, c/2 fresh; February 9, c/2, one egg fresh, one slightly incubated; February 10, c/2 fresh; March 1, c/1 slightly incubated; March 5, c/1 moderately incubated. The weight of female birds killed varied from $4\frac{1}{4}$ to $4\frac{3}{4}$ lbs.

Hieraëtus fasciatus. Bonelli's Eagle.

Hume remarks of this species ('Nests and Eggs of Indian Birds,' 2nd ed. vol. iii. p. 140) : "Many pairs were breeding in the precipices of the Salt Range, near Mayo Mines, when I last visited there." The Mayo Mines are those situate at Khewra, above Pind Dadan Khan.

Hieraëtus pennatus. The Booted Eagle.

A specimen was seen in the Rak on January 25 ; it had just taken a crow, which my terrier surprised and captured from the bird while it was on the ground.

Butastur teesa. The White-eyed Buzzard-Eagle.

675. 12.4.1913. Chakwal. ♂. Wing 308 mm.

742. 31.5.1913. Jhelum. ♂. „ 308 mm.

A common summer resident and breeding-species, first noted on March 20, and last seen on October 13. The eggs are laid about the end of April.

[Iris white, tinged with lemon ; feet dirty yellowish ; claws black ; cere dull orange-yellow ; eyelid dull orange ; bill, basal half flesh-yellow, anterior half black. Beetles, grasshoppers, and lizards in gizzard.—*C. B. T.*]

Haliaëtus leucoryphus. Pallas' Fishing Eagle.

A fairly common winter visitor from September until about the end of March, the eyries being situated all along the river at intervals of a few miles. There is a well-known eyrie situated about two miles above Jhelum city at the top of an enormous cotton-tree, which can only be scaled with the aid of ropes. This nest contained two eggs on February 25, which appears to be an unusually late date.

Milvus govinda. The Common Pariah Kite.

A very common resident, found everywhere, including the Salt Range. Nidification commences in January.

It is probable that *Milvus melanotis* will be found to occur as a winter visitor in the neighbourhood of Jhelum. I believe that several very large Kites seen by me about January were of that species, but unfortunately no specimen was shot.

Elanus caeruleus. The Black-winged Kite.

Twice noted, one at Duman on March 2, and one at Jhelum on March 27. The latter was hovering over the lands by the river, and was much worried by crows.

Circus macrurus. The Pale Harrier.

Circus cineraceus. Montagu's Harrier.

Circus cyaneus. The Hen-Harrier.

These three species of Harrier all probably occur in the district, with *Circus macrurus* in the majority, but I have not obtained any specimens, and am not well acquainted enough with these Harriers to separate them on the wing. It must suffice to say that I have observed "grey" adult and "ring-tail" immature Harriers to be common, especially on migration in September and October, and from February until April; a few also have been observed in the winter months.

Circus æruginosus. The Marsh-Harrier.

1368. 8.4.1914. Jhelum. ♂. Wing 411 mm.

Fairly common from August until April, except in December and January. A single individual in very ragged plumage noted on June 8; occurs in the Salt Range.

[Iris and feet yellow; cere greenish; eyelid plumbeous; claws blue-black; bill blue-black, lighter at the base. Lizards in gizzard.—C. B. T.]

Buteo ferox. The Long-legged Buzzard.

951. 15.12.1913. Parhi Darweza. ♂.

1312. 17.2.1914. Jhelum. ♀.

A fairly common species, but only noted in winter from about November until February. Theobald states that this bird breeds in March in the Salt Range of Jhelum district, but Hume ('Nests and Eggs,' 2nd ed. iii. p. 126) shows considerable doubt of the correctness of the assertion, which is not supported so far as my observations go. It is, of course, possible that Theobald met with an isolated pair breeding, as the nest has been found on one occasion at Nowshera.

but that *Buteo ferox* is accustomed to breed in the Salt Range must, I think, be clearly denied.

Buteo desertorum. The Desert Buzzard.

916. 3.11.1913. Jhelum. ♂. Wing 378 mm.

In addition to the specimen obtained, a second bird, probably of this species, was observed to be haunting the heavier jungle in the Rak during the whole of January.

[Iris pale brown ; feet yellow ; claws black ; bill black ; cere and gape dull greenish yellow.—*C. B. T.*]

Astur palumbarius. The Goshawk.

I have no records of this Goshawk occurring in the district, but it is generally stated amongst the natives of the upper part of the district that stray birds have been caught in the Diljabbar Rak in the Salt Range. One bird in particular is talked of as having had "a snow mark" on it when caught, a sign that it had that morning arrived from the Himalayas, which stand out clearly to be seen across the Jhelum River.

Astur badius. The Shikra.

747. 3.6.1913. Jhelum. ♀ ad. Wing 206 mm.

826. 20.8.1913. „ ♀ „ 207 mm.

836. 30.8.1913. „ ♂ „ 178 mm.

876. 17.9.1913. „ ♂ ad. „ In moult.

A common resident in the district, including the Salt Range. There were also signs of a distinct autumn passage about October and November. These game little Hawks are easily caught by means of a net called the "Do gazza," consisting of a square of fine net about 6 ft. by 4 ft., hung vertically between two upright sticks, in front of which a live quail is tethered as bait. The Hawk stoops at the quail and gets entangled in the net. In fact, they are apt to be a nuisance, often being taken in nets set for nobler quarry. The Shikra is chiefly used to take Mynahs and Quail, being held in the hand and literally thrown at the bird selected.

[*Adult male*. Feet yellow, claws black ; cere dull greenish yellow ; bill blue-grey, anterior half black.

Juvenile. Feet pale greenish yellow; iris pale yellow.

The female had both right and left ovary developed; the adult male is just completing a full moult.—*C. B. T.*]

Accipiter nisus. The Sparrow-Hawk.

1356. 28.3.1914. Jhelum. ♂. Wing 208 mm.

A not uncommon winter visitor from September until the first half of April; said to occur often on the sparsely-wooded slopes of the Salt Range; at any rate, I noted a male on February 4 in a small tree in one of the bare nullahs at the base of the hills.

[Iris orange with a paler inner ring; feet bright yellow; bill, basal half blue-grey, rest black; cere and gape dull greenish yellow.

This is a paler bird on the upper parts than British specimens, and in this respect matches some from China.—*C. B. T.*]

Pernis cristatus. The Crested Honey-Buzzard.

A summer visitor in small numbers, first noted on March 18 and last on October 28. A pair or two probably breed in the Rak.

Falco peregrinus. The Peregrine Falcon.

957. 10.12.1914. Jhelum. ♀. Wing 365 mm.

A not uncommon winter visitor from the beginning of October until the last week in March, chiefly met with along the river. The Peregrine in the Jhelum district is a bird of very fixed habits. Having arrived, it selects a regular locality and stays there, largely keeping to one particular tree as a resting-place. Before sunrise it sallies forth to hunt, and having fed, retires to the favourite tree for meditation until the evening brings it out again. The same line of flight may be followed for several days in succession as it proceeds to the hunting-grounds. Peregrines were often to be seen in the gardens of the Civil Lines—at one time I knew of at least three individuals that had been noticed within a mile of my bungalow.

Falco peregrinator. The Shahin Falcon.

A young falcon of the year was brought in to me on November 27 by two men who saw it fall from a tree in the Civil Lines; it proved to be suffering from a gunshot wound in the breast, and was so exhausted that it was a question whether I should kill the bird for a specimen or hand it over to my falconer; the latter course prevailed, and my man managed to save its life and train it to the lure. The species is probably a fairly regular winter visitor, as there is a well-known eyrie in the foot-hills some 30 miles away, from which Colonel Stephen Biddulph once obtained a good cass of Eyasses.

Falco barbarus. The Barbary Falcon.

Not known to breed in the district, but probably a passage migrant. Several medium-sized Falcons seen were doubtless of this species, but definite identification is difficult except with the aid of a gun or under the most favourable circumstances. I have seen or possessed several Barbary Falcons (if *F. barbarus* is really the correct name of *F. babylonicus*) which were caught on their first migration in July and August in the Campbellpore district farther north.

[In order to avoid any confusion, I must point out that the species which Mr. Whistler met with was almost certainly *F. peregrinus babylonicus* of Sclater, and is no doubt the race which Anglo-Indians call the Barbary Falcon. The Barbary Falcon proper, however, is a North-African form, now known as *F. peregrinus pelegrioides* of Temminck—the *Falco barbarus* of most authors; this name, which was given by Linnæus to a Falcon depicted by Albin, however, has been recently rejected, as it is considered that Albin's plate is unrecognisable (*vide* Hartert, Vög. pal. Faun. ii. p. 1051).—C. B. T.]

Falco jugger. The Laggar Falcon.

The common and resident Falcon of the district, nesting in March and April, both in trees and in holes and on ledges of the cliffs in the Salt Range and the nullahs of the Chakwal

plateau. Although but seldom trained in the Punjab, owing to the ease with which better kinds of Falcon are obtained, the Laggar is a bold bird of fine flight, and to the falconer is a nuisance through resenting the presence of trained birds on its own particular beat. I have seen one stoop at a Peregrine feeding on its owner's wrist, and at hooded Peregrines placed temporarily on the ground, while on another occasion a pair drove out of sight and lost for me a young Barbary which I had flown at a Partridge. They are not such fast flyers as Peregrines.

Falco cherrug. The Saker or Cherrug Falcon.

A not uncommon winter visitor, noted on various dates from November until February. On April 9 a trained Falcon of this species was caught in an exhausted condition by a man near Jhelum and brought in to me, but I never found the owner, who had most likely released it at the end of the season.

Æsalon regulus. The Merlin.

942. 5.12.1913. Chakwal. ♂. Wing 200 mm.

A winter visitor in small numbers, noted from December until February.

[Iris dark brown; feet yellow, claws black; bill, basal half blue-grey, anterior half black.

This belongs to the pale race, *Æ. r. insignis* Clark.—*C. B. T.*]

Æsalon chicquera. The Red-headed Merlin.

828. 21.8.1913. Jhelum. ♂. Wing 197 mm.

A common and resident species, nesting in March and April.

[Iris brown; feet bright yellow, claws black; bill, basal half flesh-yellow, rest blue-black; eyelid and cere bright yellow.—*C. B. T.*]

Tinnunculus alaudarius. The Kestrel.

1350. 22.3.1914. Jhelum. ♂. Wing 246 mm.

A common winter visitor from August until the beginning of April. Possibly a few pairs breed in the Salt Range, as

an occasional bird may be seen on the Chakwal plateau in the hot weather, and I noted a couple at Chua Saidan Shah on June 30.

[Iris dark brown ; feet bright yellow, claws blue-black ; bill blue-black, darkest at tip and shading to yellowish at base ; cere yellow, eyelid greenish yellow.

This specimen is paler everywhere than many British examples ; but I can match it with a Suffolk specimen.—*C. B. T.*]

Crocopus sp. Green Pigeon.

A pair of Green Pigeons appeared in my compound on November 26 ; but I was unable to identify the species, and did not see them again.

Columba intermedia. The Indian Blue Rock-Pigeon.

A common resident throughout the district, breeding both in buildings and in small cliffs.

Turtur ferrago. The Indian Turtle-Dove.

A spring and autumn passage-migrant, noted in April and October ; but not many were met with. An odd bird or two probably occurs during the winter as well.

Turtur suratensis. The Spotted Dove.

932. 21.11.1913. Jhelum. ♀. Wing 130 mm.

964. 2.1.1914. „ ♂. „ 140 mm.

Uncommon. Two noted on November 21, and single birds noted on January 2, February 10, and March 21. A winter straggler from the foot-hills.

[*Adult*. Iris claret-colour ; eyelids and feet duller, claws blackish ; bill lead-black.

932 is in juvenile plumage just commencing to moult, and has the iris pale reddish brown ; tarsi plum-colour ; feet and bill plumbeous.—*C. B. T.*]

Turtur cambayensis. The Little Brown Dove.

A common resident throughout the district, including the Salt Range, where it is one of the most noticeable birds along the hill-roads. Nests may be found throughout the hot weather, but are most numerous from April until June.

Turtur risorius. The Indian Ring-Dove.

A most abundant resident, occurring throughout the district, but less numerous in the Salt Range than the last species. About January and February the Ring-Dove collects in large flocks, and is then very noticeable in the fields. Nests throughout the hot weather.

Cenopopelia tranquebarica. The Red Turtle-Dove.

A common summer visitor, arriving about the middle of March and becoming general before the end of the month ; it leaves again in August, the last bird being seen on 2nd September. Nests in April and May.

Pterocles arenarius. The Large or Black-bellied Sand-Grouse.

A winter visitor, occurring in flocks on the Chakwal plateau and in larger numbers towards Pind Dadan Khan. Not observed near Jhelum. The first birds were reported to me as seen on the 1st of October. Last noted on February 22 ; but I did not have an opportunity of visiting the best ground for them after that date.

Pteroclorus exustus. The Common Sand-Grouse.

698. 30.4.1913. Jhelum. ♀.

848. 7.9.1913. Lilla. ♂. Wing 175 mm.

862. 14.9.1913. „ ♂. „ 185 mm.

A resident species, whose numbers are very largely increased during the winter by migration commencing about the beginning of September. Most numerous on the Pind Dadan Khan side of the Salt Range.

[Iris dark brown ; feet and bill lead-slate ; eyelids lead-colour. Seeds and beetles in gizzard. Just completing a full moult.—*C. B. T.*]

Pavo cristatus. The Common Pea-fowl.

Very numerous in the gardens of the Salt Range and about Jelalpur, but not occurring on the Chakwal plateau or about Jhelum. It is, of course, a resident species.

Coturnix communis. The Common or Grey Quail.

680. 26.4.1913. Jhelum. ♂. Wing 109 mm.

681. „ „ ♀. „ 112 mm.

856. 11.9.1913. Sardi. ♂. „ 112 mm.

857. „ „ ♂. „ 108 mm.

A spring and autumn passage-migrant in varying numbers, the migrations attaining their height in April and September respectively.

[Iris yellow-brown ; feet brownish flesh ; bill dark horn-brown. The September birds are adult and just commencing to moult.—*C. B. T.*]

Caccabis chucar. The Chukor Partridge.

A resident in fair numbers on the higher slopes of the Salt Range. Theobald notes that it breeds in April and May.

Ammoperdix bonhami. The Seesee Partridge.

Resident and fairly numerous in the Salt Range, being found from the base upwards. Eggs were obtained for me in April, but I met with a covey of half-grown young, strong on the wing, on the 2nd of July. Theobald says that it breeds in April, May, and June.

Fringilla pondicerianus. The Grey Partridge.

A resident throughout the district, but somewhat scarce, except in the Salt Range Raks. According to Theobald it lays in the first week of April and in May and September.

Turnix dussumieri. The Little Button-Quail.

Theobald ('Nests & Eggs,' 2nd ed. vol. iii. p. 371) describes the breeding of the Little Button-Quail in the third week of August in the neighbourhood of Pind Dadan Khan, hence it is probable that a Button-Quail flushed by me at Chakwal on October 23 was, as I thought, of this species. From the bordering territory of Gujar Khan in Rawal Pindi district, in May 1911, a clutch of four eggs, almost certainly of this species, were brought in to me by a shikari. This Button-Quail is therefore, in all probability, a resident, but scarce in these parts.

Porzana pusilla. The Eastern Baillon's Crake.

Two Crakes only were met with by me in the district, and both were apparently of this species on migration; one was flushed on May 10 by the Rak, and the other on September 2 on the golf-course.

Gallinula chloropus. The Moorhen.

Noted as numerous on a tank at Sohawa on April 8.

Fulica atra. The Coot.

Two seen, both on the river close above Jhelum, on October 4 and January 19 respectively.

Both the Waterhen and the Coot are probably found on the jheel at Kallarkahar—a place that I have not been able to visit.

Grus communis. The Common Crane.

A winter visitor from October until April, and of course most numerous in the riverain area below Jhelum.

Houbara macqueeni. The Houbara Bustard.

A winter visitor from November until February, according to the district gazetteer. I saw two only, namely, one in the fields amongst rocky ravines near Sangoi on November 30, and one near Chakwal on November 23; but I believe that they are fairly numerous in the direction of Pind Dadan Khan.

Esacus recurvirostris. The Great Stone-Plover.

894. 10.10.1913. Jhelum. ♀.

A summer visitor to the sand-banks of the river, where it breeds, from the end of March (first noted on the 27th) until the middle of October. I found two eggs on a sand-bank island on April 10, 1914, within a few yards of where I had found two young in down on April 30, 1913.

Cursorius gallicus. The Cream-coloured Courser.

988. 25.1.1914. Jhelum. ♂. Wing 168 mm.

989. " " ♀. " 157 mm.

A party of three were seen on bare rocky ground near

Chakwal on October 23, and a party of seven or eight were found on a sandy island on the river above Jhelum on January 25. The stomachs of the two birds shot contained grasshoppers.

Glareola lactea. The Small Indian Pratincole.

683. 20.4.1913. Jhelum. Wing 163 mm.

690. 22.4.1913. „ „ 157 mm.

691. 24.4.1913. „ In down.

809. 11.8.1913. „ ♂ imm. Wing 142 mm.

863. 15.9.1913. „ ♂. Wing ?

A most extraordinarily abundant summer visitor to the Jhelum valley, arriving about the end of February (a single bird being noted on the 27th) and disappearing by the second week in October (last seen on the 10th). It breeds in April on the sand-banks of the river or amongst the stones on the mud-flats that border some of the larger islands. Immense numbers of nests, indeed whole colonies at a time, are swept away when the river is swollen by rain-water or melted snow, and this seems to be the only check to their increasing beyond all bounds, for they have no enemies that I know of.

Every evening from June onwards a steady flight of Pratincoles up the river, individuals and flocks, took place, and I presume that they must work down again during the night, as I never observed the return flight. The large eyes suggest that they are nocturnal to some extent. On August 11 I saw five or six large flocks flying at so great a height that I was unable to identify them through glasses until they descended to lower levels.

[Iris dark brown; feet and bill black, gape scarlet.

809 is just finishing a complete moult, and appears to have traces of juvenile plumage remaining. It differs from the adult spring birds in having the whole throat ticked with dark brown, and in having pale rufous edges to the head and faint greyish edges to the mantle-feathers. 863 is also finishing a complete moult and is an adult; it differs from 809 in having the pale edges of the upper parts and

the ticking on the throat only just indicated. The downy young is buffish white above, indistinctly mottled on the head and back with dark brown; underparts whitish; feet and bill plumbeous grey, blackish at tip.—*C. B. T.*]

Hydrophasianus chirurgus. The Pheasant-tailed Jacana.

Noted as follows:—June 11, six near Sohawa; June 15, one by the river; June 24, three on the river; July 18, one on the river. Evidently a passage migrant only.

Sarcogrammus indicus. The Red-wattled Lapwing.

A resident in small numbers, and greatly reinforced during the summer months by immigrants, which begin to arrive in February and reach their full numbers by the middle of March. They would seem to leave again about the middle of September, but a few of the departing birds linger on into October. The species is comparatively scarce during the winter. It makes an interesting quarry for trained Falcons unless there is too much cover, when it is apt to put in and may be taken up in the hand.

Vanellus vulgaris. The Lapwing or Peewit.

986. 25.1.1914. Jhelum. ♂. Wing 227 mm.

1306. 14.2.1914. „ ♀. „ 215 mm.

A fairly common winter visitor, first seen on November 17 and last noted on March 6.

Chettusia gregaria. The Sociable Lapwing.

Several flocks were noted about in March and the last few days of February; it is probably a spring passage-migrant only.

Chettusia leucura. The White-tailed Lapwing.

A flock of Lapwings seen near the river on November 9 were apparently of this species.

Ægialitis alexandrina. The Kentish Plover.

687, 688, 689. 22.4.1913. Jhelum. ♀, ♂, ♀. Wing 119,
108, 103 mm.

889. 6.10.1913. Jhelum. Wing 110 mm.

902. 15.10.1914. „ ♂. „ 110 mm.

903. „ „ Sex? „ 109 mm.

Occurs not infrequently in parties and in flocks, but its exact status is not clear; possibly a passage migrant only. Most birds were found in October, January, and March, but odd birds were met with in September and April, and two were seen on the 12th of July. A party of three was found in a sandy torrent bed near Chakwal on October 25, and these were the only ones noted away from the river.

[Iris dark brown; bill and feet black.

The September birds are young ones moulting the body-feathers. The spring females have the lores, crown, and half-collar rusty brown. All belong to the typical race.—*C. B. T.*]

Ægialitis dubia. The Little Ringed Plover.

692, 693, 694. 26.4.1913. Jhelum. Nestlings in down.

864. 15.9.1913. Jhelum. Imm. Wing 109 mm.

Common and found throughout the year but probably partly migratory, as their distribution was rather uneven during different months. Breeds commonly about April on the sand-banks of the river and, I believe, in the sandy "kas" or torrent-beds of the Chakwal plateau, where I found them in pairs in March and April. This Plover is more often found away from the water and feeding on the grassy stretch by the river than the Kentish Plover, which keeps almost entirely to the sand-banks.

[Iris dark brown; eye-rim pale yellow; feet olive-yellow; claws and bill black.

In full body-moult, just acquiring the black collar and frontal band. Downy young have the feet lead-grey. They differ from *Æ. hiaticola* of the same age in the following respects:—A more distinct black line above the eye passes round the base of the crown above the white collar; below the white collar a black band passes round on to the throat; a black band sharply separates off the white carpus from the rest of the wing; a black band separating upper- and under-parts along the flanks to the tail is more distinct.

I am unable to state whether these specimens belong to the race *Æ. d. jerdoni* or not. A breeding female from elsewhere in the Punjab has a *broad* frontal band of black and

a wing of 110 mm. (worn), bill 11 mm. Unfortunately, in the latest review of the species ('Ibis,' 1915, p. 533), the authors omit to give the length of the wing in the two sexes, also the length of the bill. This specimen had in life the base of the bill *red*, and not bright yellow as is said to be invariably the case in adults of *A. d. jerdoni*.—C. B. T.]

Himantopus candidus. The Black-winged Stilt.

A passage migrant in small numbers during April–May and August–September; a few birds may also be met with during the winter.

Numenius arquata. The Curlew.

Two were seen on the river on November 6 above Jhelum.

Limosa belgica. The Black-tailed Godwit.

On August 31 I saw a party of six large Waders flying down stream; I did not obtain a specimen, but feel certain that they were of this species.

Totanus hypoleucus. The Common Sandpiper.

676. 17.4.1913. Jhelum. ♀. Wing in moult.

711. 7.5.1913. „ ♂. „ 107 mm.

726. 11.5.1913. „ ♀. „ 115 mm.

The Common Sandpiper may be met with in every month of the year in the Jhelum district, as, although it does not breed within the district, yet it does so commonly in Kashmir, whence comes the Jhelum River, and the river is evidently one of the recognised routes to and from the breeding-grounds; hence there are always a few birds, either late in going up to breed or early in coming down, or else not breeding at all, to be found along the river-banks and islands. It is most numerous on passage in April and May and again from August until October, but is also sufficiently common during the winter months from November until March. This Sandpiper is ordinarily a solitary species, but I met with some flocks on migration on May 6. It can swim and dive well if necessary.

[Iris dark brown ; feet pale olive-green, claws blackish ; bill olive-brown, blackish towards the tip and fleshy towards the base of lower mandible.

The April bird is in full moult all over—body, wings, and tail.—*C. B. T.*]

Totanus glareola. The Wood-Sandpiper.

803. 3.8.1913. Jhelum. ♂. Wing 121 mm.

803. 10.8.1913. „ ♂. „ 124 mm.

A fairly common passage-migrant in small flocks in April and again in August and September. It frequents flooded fields and marshy ground, and was not noted on the sand-banks of the river. Found as high as Sardi in the Salt Range.

[Iris dark brown ; feet greenish olive, claws black ; bill black, lighter olive at base.

803 in juvenile dress, 808 in worn breeding-plumage.—*C. B. T.*]

Totanus ochropus. The Green Sandpiper.

1362. 3.4.1914. Jhelum. ♀. Wing 144 mm.

A common winter visitor and a spring and autumn passage-migrant ; a few non-breeding birds may also be met with during the summer months. The spring migration passes through in April and May, and the return passage commences in July and reaches its height in August.

[Iris dark brown ; legs dull lead-green ; bill lead-black.—*C. B. T.*]

Totanus calidris. The Redshank.

925. 9.11.1913. Jhelum. ♀. Wing 163 mm.

926. „ „ ♂. „ 164 mm.

990. 25.1.1914. „ ♀. „ 159 mm.

A winter visitor common from January until May and in less numbers from August (first noted on the 5th) until December. Only met with in the neighbourhood of the river.

[Iris dark brown ; feet orange-red ; bill dark plumbeous, base of lower mandible reddish.

Full winter plumage.—*C. B. T.*]

Totanus glottis. The Greenshank.

696.	30.4.1913.	Jhelum.	♀.	Wing	195 mm.
839.	31.8.1913.	„	♀.	„	195 mm.
890.	6.10.1913.	„	♂.	„	188 mm. (worn).
949.	10.12.1913.	„	♂.	„	179 mm.
1370.	10.4.1913.	„	♀.	„	201 mm.

A winter visitor, and a spring and autumn passage-migrant in March and April and August and September respectively; a few late birds were met with in May and one or two early arrivals in July. None were seen in June.

[Iris dark brown; feet pale plumbeous green, claws blackish; bill olive-grey, darker towards tip.

The April birds are nearly into summer plumage, moulting the body-feathers together with the long tertials and innermost greater and median coverts. 839 is in juvenile dress; 890 is adult, just completing a full moult; 949 is a young bird in full winter dress, and has moulted the body-feathers, tertials and their coverts, and probably part of the tail.—*C. B. T.*]

Pavoncella pugnax. The Ruff and Reeve.

1331.	6.3.1914.	Chakwal.	♂.	Wing	187 mm.
1338.	13.3.1914.	Dumman.	♂.	„	190 mm.
1351.	24.3.1914.	Jhelum.	♀.	„	161 mm.

Appeared in flocks on migration from March 6 until April 10. Found both on the river, or on patches of marshy ground anywhere in the district.

[1351 is in winter plumage still; the other two have commenced to get the summer plumage, but no ruff is visible yet. The female has the legs dull lead-colour; the males have the legs pale orange and pale fleshy brown respectively.—*C. B. T.*]

Tringa minuta. The Little Stint.

927. 9.11.1913. Jhelum. Wing in moult.

[An adult just completing full moult.—*C. B. T.*]

Tringa temmincki. Temminck's Stint.

820.	17.8.1913.	Jhelum.	♂.	Wing	101 mm.
978.	18.1.1914.	„	„	„	99 mm.
987.	25.1.1914.	„	♀.	„	96 mm.

Stints were noted about the sand-banks and mud-flats of the river, and occasionally at ponds throughout the district, singly, in parties, and in flocks, on numerous dates from the 5th of August until the 22nd of April. I am, however, quite unable to tell the Little Stint and Temminck's Stint apart without the aid of a gun, so have to lump the two species together. The majority were seen from January until April.

[Iris dark brown; feet gamboge, claws blackish; bill lead-black.

The August bird is in worn breeding-dress and has just begun to moult.—*C. B. T.*]

Tringa alpina. The Dunlin.

I saw what appeared to be a few Dunlins in a large flock of the smaller Waders on the 12th and 25th of January, but no specimens were obtained.

Gallinago cœlestis. The Common Snipe.

A few were met with on different dates during the winter in small patches of marshy ground. There is no good Snipe jheel in the district.

Gallinago gallinula. The Jack Snipe.

883. 3.10.1913. Jhelum. Wing 115 mm.

Shot from a ditch by the golf-course.

[Iris brown; feet pale grey-green; bill lead-grey to black at tip.—*C. B. T.*]

Larus ridibundus. The Laughing Gull.

886. 4.10.1913. Jhelum. Wing 305 mm.

1348. 20.3.1914. „ ♀. „ 298 mm.

A number of these Gulls were noted on the river during the spring migration in the latter half of March, and a few were seen on the autumn migration in August and October. An occasional bird may be found during the winter.

The birds seen in March were mostly, if not all, immature.

[Iris brown; feet fleshy-orange, claws black; bill flesh-pink with black tip.

Both are young birds in first winter plumage.—*C. B. T.*]

Larus cachinnans. The Yellow-legged Herring-Gull.

A large immature Gull, seen on the river on October 27, was most probably of this species.

Hydrochelidon hybrida. The Whiskered Tern.

712. 7.5.1913. Jhelum. ♀. Wing 225 mm.

713. „ „ „ 234 mm.

723. 11.5.1913. „ „ 234 mm.

778. 5.7.1913. „ „ 217 mm.

Immense numbers were seen on the river from April until the first week in July, and it is remarkable that they were usually to be seen working up-stream, *i. e.*, towards Kashmir, their breeding-ground. But whether this was a steady migration of birds passing upwards without intermission, or whether I saw the same birds, or many of them, day after day, and they were merely feeding upwards to return down again by night, I cannot say. Of the return autumn migration I saw no trace except a couple of old birds in September.

[Iris rich brown; feet red, claws black; bill dark purple-red.

The adult July bird has just commenced to moult the body-feathers and wings; the May birds are adult and in fresh body-feather, with traces of moult on crown and throat.—*C. B. T.*]

Sterna anglica. The Gull-billed Tern.

A few were seen on migration in the second half of March and the first half of April. It is possible that some birds breed in the district, as two pairs were met with on June 8 between Jhelum and Jelalpur. Besides the above, a Tern which appeared to belong to this species was noted on July 13 and August 11.

Sterna seena. The Indian River-Tern.

766. 19.6.1913. Jhelum. Imm. ♀. Wing 263 mm.

804. 6.8.1913. „ Ad. ♀. „ 276 mm.

A very common resident, breeding on the sand-banks of the river in March and April.

[Feet yellow, claws black ; bill dull yellow, blackish at tip.

A juvenile bird just commencing body-moult. The adult has the iris dark brown, feet coral-red, and is moulting all over.—*C. B. T.*]

1504. *Sterna melanogaster*. The Black-bellied Tern.

699, 700, 701. 30.4.1913. Jhelum. ♂, ♂, ♂. Wing 215,
220, 227 mm.

725. 11.5.1913. Jhelum. ♂. Wing 218 mm.

763. 16.6.1913. „ ♂. „ 207 mm. (worn).

765. 19.6.1913. „ „ 228 mm.

909. 28.10.1913. „ ♀. „ 236 mm.

975. 12.1.1914. „ ♀. „ 240 mm.

1357. 30.3.1914. „ ♀. „ 224 mm.

A very common resident, breeding on the sand-banks of the river in March and April. The statement that the winter plumage consists in the cap being white with a few black streaks, and the lower parts white does not appear to be correct. Birds in the supposed winter plumage were almost entirely noticed from May until August, whereas practically every bird noticed in the winter (and I paid especial attention to this) had a black cap and belly. The change will probably be found to be one of age and not season.

[From Mr. Whistler's remarks it appears that the plumages of this species are not rightly understood, and unfortunately his specimens do not entirely clear the matter up. That some birds in winter plumage have the head and belly black is clear from his statement, and is borne out by the October adult bird, which has just completed a full moult, and has the crown, belly, and under tail-coverts pure black. The January and April birds are in similar plumage, but slightly worn. The March bird has old worn brown feathers with grey edges on the crown, amongst which new *black* feathers are appearing ; new pearl-grey feathers on mantle, belly, and under tail-coverts ; old, worn feathers (white), amongst which are one or two odd black feathers.

The May birds are similar; both have paler bills than the adult, with dusky tips. Mr. Whistler notes of the March bird that "the ovary was minute at a time when most pairs had eggs, and that very few of these white-bellied birds were to be seen." I regard these two birds as young non-breeding birds of the previous year.

Similar to these last two is the June bird (763), which undoubtedly is a non-breeding bird of the previous year, and represents a stage further on in the sequence of the plumage. It, like the May birds, has an old brown crown, which is being replaced by black, and is getting new white feathers on the underparts; wings and tail have just begun to moult. Parts of this plumage are probably moulted again about September, and the bird, getting the black belly, now becomes fully adult. Details of this change are lacking, as neither Mr. Whistler nor the British Museum has any August or September birds; but in a series of 52 birds obtained from October to May, every month being represented by several specimens in the British Museum, *no birds are in any plumage but the adult plumage* (with black crown and belly and long streamers), except what are obviously birds of the year (with brownish head edged with grey, white underparts, and short streamers). Moreover, a late bird from Burma on Nov. 19 in the British Museum shows the last stage of this moult.

765 is an interesting bird; it is obviously fully adult, and the black head and belly are being replaced by *white* feathers in June, and the moult of wings and tail has just begun. Now we know from the above that all, except birds of the year, by October have black crowns and bellies, so that this white plumage can only be held for a short time, say two months, and is moulted again. It may appear strange at first that a Tern should assume breeding-plumage by October, breed in March in that plumage, and then moult into a sort of eclipse plumage about June and then into breeding-plumage again by October; and yet it is not so very startling when one considers that when the Arctic Tern leaves us about September it has not yet assumed its winter plumage, and that

by the end of January it is well on its way into breeding-plumage again, though it is not going to nest much before the beginning of June. It looks as if the winter plumage in these Terns is only held for a short time, and may, perhaps, correspond with the eclipse plumage of Drakes.

To sum up, then, the sequences of plumage in this species so far as I am able to trace them :—

The juvenile plumage, which is of the usual type and roughly resembles that of the Sandwich Tern, is moulted some time during the autumn, and the bird attains its first winter plumage, in which the crown is brown with grey edges, underparts white, mantle pearl-grey, and it has short streamers and the tip of the bill dusky. From the following March onwards a slow and irregular moult takes place, some new black feathers appear in the crown and odd black feathers on the belly, and the bird does not breed ; by June the bird is moulting everywhere, including wings and tail, and gets a new white belly and long streamers, while the dusky tip to the bill is now lost ; by October the underparts, at all events, have been moulted again, and the bird now has the belly black and is adult ; this plumage is carried through to the following year, and the bird then breeds. About June the black belly and head is moulted to a white, and the wings and tail are shed with the rest of the body-plumage ; this white phase is only held for a short time, and by October the bird is again in breeding-plumage.

I am much indebted to Mr. F. W. Smalley for his kindness in going carefully through the series in the British Museum and making notes for me.—*C. B. T.*]

Sterna minuta. The Little Tern.

Not common, and probably a summer visitor only, breeding on the sand-banks. First noted on April 3 and not seen after July 12.

Rhynchops albigollis. The Indian Skimmer or Scissors-bill.

802. 2.8.1913. Jhelum. ♂. Wing 382 mm.

A summer visitor to the river in small numbers ; first

noted on March 20 and last seen on August 15. Breeds about April.

[Iris dark brown; feet bright vermilion, claws black; bill orange-red, yellowish at tip.

Adult just commenced to moult.—*C. B. T.*]

Pelecanus sp.? Pelican.

Pelicans were seen on the river as follows:—April 28, one; June 19, one; July 5, one; July 18, two. In no case was a specimen killed, so the species represented remains uncertain.

Phalacrocorax carbo. The Large Cormorant.

Would appear to be a passage migrant only. In January several were seen on various dates from the 4th to the 25th, a big flight of about 30 being met with on January 12. On the autumnal migration several birds were noted from October 10 until November 3.

Ibis melanocephala. The White Ibis.

A flight of White Ibises were seen on June 19, and two birds were seen with a party of *Pseudotantalus leucocephalus* on a sand-bank on the river on June 24. Not known to breed in the district.

Inocotis papillosus. The Black Ibis.

882. 2.10.1913. Jhelum. Imm.

Not uncommon, and met with throughout the year, but I do not believe that the species nests in the district.

Platalea leucorodia. The Spoonbill.

Probably a summer visitor only, from the end of May until August, and breeding doubtless somewhere in the neighbourhood of the river. Not very often seen, but as many as 20 birds were met with in one flock. No nests found.

Ciconia alba. The White Stork.

A party of three White Storks was seen by the Chakwal tonga-road on December 8, and one was seen flying high overhead at Jhelum on April 9.

Ciconia nigra. The Black Stork.

Solitary Storks seen on February 24 by the Chakwal tonga-road, and on the 8th of March at Miswal, appeared to belong to this species.

Dissura episcopus. The White-necked Stork.

Two were seen at Sangoi on the 1st of February, and two (possibly the same) flying down the river near the Rak at Jhelum on April 12.

Xenorhynchus asiaticus. The Black-necked Stork.

A few Black-necked Storks were seen in a field by the river between Jhelum and Jelalpur on June 8.

Pseudotantalus leucocephalus. The Painted Stork.

770. 24.6.1913. Jhelum. ♀.

784. 12.7.1913. „ ♀.

Between June 2 and September 2 a number of these fine birds were noted haunting the river in the neighbourhood of the Government Rak. They were most numerous in June, but, after that, generally appeared in twos and threes, although a party of seven were seen on August 13. No nesting-place was discovered, and both the above birds had minute ovaries, so they were possibly on migration. An odd bird or two was seen in the same place on the 10th, 11th, and 12th of April, just before I left the district.

Ardea manillensis. The Eastern Purple Heron.

A large Heron flushed from a reed-bed in the middle of the river opposite to Jhelum city on June 24 was almost certainly of this species.

Ardea cinerea. The Common Heron.

Although not known to breed in the district, Herons were noted in every month of the year except September and October. There was a very marked passage on the river near Jhelum during April.

Herodias alba. The Large Egret.

991. 4.2.1914. Sohawa. ♂.

An odd bird or two were met with during the winter, and

a party of four or five were found on the river on April 10, doubtless on migration. It probably does not breed in the district. .

Herodias garzetta. The Little Egret.

684. 20.4.1913. Jhelum. ♂. Wing 284 mm.

A summer visitor in some numbers to the river, where I found a nesting colony breeding in company with *Bubulcus coromandus*, *Ardeola grayi*, and *Nycticorax griseus* on a small thickly wooded island. Odd birds arrived early (first date noted February 27), but the species did not become common until the end of March, and perhaps did not attain to its full numbers until May. Breeding operations went on from June until August, and the majority left about September, a few birds remaining about until the beginning of October. Luckily, the fishermen and shikaris do not know the value of the plumes.

[Iris yellow; bill, tarsi, and tibia black; feet mixed blue and yellow. Occipital and some neck plumes in quill, otherwise in full plumage.—*C. B. T.*]

Bubulcus coromandus. The Cattle Egret.

762. 16.6.1913. Jhelum. ♀. Wing 238 mm.

810. 11.8.1913. „ Nestling.

A summer visitor: although it appeared in larger numbers than *H. garzetta* it arrived later, about May, commenced to leave in August, and had almost entirely departed by the end of September. It breeds in June and July, and apparently finishes breeding before the last species. The nests of this species were far the most numerous of any in the above mentioned colony.

[Iris yellow; legs mixed olive-green and brown, claws black; bill reddish yellow.

The nestling has the down white, iris white tinged with yellow, skin dull olive-green tinged with yellow along the throat and fore neck; bill and facial skin of a somewhat similar colour.—*C. B. T.*]

Ardeola grayi. The Pond Heron.

757. 15.6.1913. Jhelum. ♂. Wing 219 mm.

A resident, whose numbers are greatly increased during the breeding-season by immigration. These additional birds appear to arrive about May and depart again in September and the first half of August. It nests in June and July in any suitable clump of trees.

[Feet flesh-coloured tinged with yellow, claws black ; facial skin yellow-green ; bill: basal half blue, median portion and commissure yellowish, terminal third black.—*C. B. T.*]

Butorides javanica. The Little Green Heron.

779. 5.7.1913. Jhelum. ♀.

This specimen was shot on the sandy shore of the island mentioned above as the breeding-place of the Egrets. The ovaries, however, were but slightly developed. Another or the same individual was seen on the 21st of June near the golf-course.

Nycticorax griseus. The Night Heron.

761. 16.6.1913. Jhelum. ♂.

A common summer visitor, arriving towards the end of March and leaving at the end of August and beginning of September. A few nests were found in the Egret colony in June.

Phœnicopterus roseus. The Common Flamingo.

Capt. Whitehead informs me that Flamingoes are common throughout the winter in the Salt Range Lake of Kallar Kahar. Although I did not visit the lake myself, I had an opportunity of examining a skin obtained there, and found it to belong to this species.

Anser ferus. The Grey Lag Goose.

A common winter visitor to the neighbourhood of the river and to the Kallar Kahar Lake. Noted as late as March 22.

Anser indicus. The Barred-headed Goose.

A common winter visitor, noted as late as March 22. I was unable to observe the respective dates of arrival of the two kinds of Geese owing to difficulty of identifying the species without obtaining specimens, but I saw and heard Geese from the 9th of November onwards.

Casarca rutila. The Ruddy Sheldrake.

A very abundant winter visitor to the district, where I first noted it on the 28th of October. On the stretches of the river above Jhelum in January and February it was extraordinarily abundant, being met with in large flocks of 20 or 30 birds. On one occasion as many as 75 were counted on a single sand-bank. The majority of these birds, however, had gone by the middle of March, although a few were to be met with in April, a party of seven or eight being seen as late as the 22nd of that month.

Note.—The number of ducks which visit the district during the cold weather is very large, although, as far as I know, no species actually breeds within the district. As, when there are so many varieties to be expected and the area over which they are spread is so great, it is impossible to identify half the individuals seen, I failed in the short space of one year to work out the exact status and dates of arrival of each species. Accordingly, before giving a list of the species actually identified by me (which does not pretend to be complete), I give a short general note on the dates of arrival and departure of ducks generally.

After the spring migration had passed, four ducks, apparently some species of Pochard, were seen from the train on May 23, June 11 and 24, on a small pond in the ravine-broken ground between Dina and Domelli Railway Stations. It is possible, but not probable, that these birds were breeding there, but I was unable to visit the spot to investigate the matter. Two ducks the size of Mallard were seen on the river on June 24.

In August the return migration started by the noting

of a single duck on the 8th, and very few more had been met with by the end of the month. September, of course, saw a fair increase, and this grew steadily until it reached the maximum about January. About the beginning of March numbers began to dwindle, and by the end of the month there was a most noticeable decrease. Throughout April a few ducks were to be met with, and a few parties of Shovellers passed through during the first half of May.

Anas boschas. The Mallard.

The most common species of Duck during December, January, and February, but leaving early about the beginning of March. It is found in immense numbers on the sand-banks of the river, and visits every little grassy pond or patch of marsh in small parties.

Chaulelasmus streperus. The Gadwall.

Common winter visitor; appears to leave about the end of March, a few staying over into April.

Nettion crecca. The Common Teal.

1000. 8.2.1914. Jhelum. ♂. Wing 180 mm.

A very abundant winter visitor; the majority have left by the end of March; a few may be met with during April.

Dafila acuta. The Pintail.

Common in February and March.

Querquedula circia. The Garganey or Blue-winged Teal.

861. 12.9.1913. Sardi. ♂. Wing 198 mm.

Only definitely identified on September 12, when I met with a couple in a flooded field at Sardi in the Salt Range.

[Iris brown; feet plumbeous slate; bill plumbeous black.

A male in full eclipse plumage.—*C. B. T.*]

Spatula clypeata. The Shoveller.

A common winter visitor, and the latest of the ducks to depart; migrating parties may be met with on the river in April and the first half of May.

Nyroca ferina. The Pochard.

A common winter visitor; noted as late as April 22.

Nyroca ferruginea. The White-eyed Duck.

1343. 16.3.1914. Sohawa. ♂ ad. Wing 180 mm.

Fairly common, considering the scarcity of suitable waters for it.

[Iris whitish; feet mixed black and plumbeous, webs black; bill plumbeous black.—*C. B. T.*]

Nyroca fuligula. The Tufted Duck.

Common winter visitor, staying well into March.

Mergus albellus. The Smew.

974. 12.1.1914. Jhelum. ♀. Wing 178 mm.

This bird was secured from a flock noticed diving in the shallows of the river above Jhelum.

Podiceps albipennis. The Indian Little Grebe.

A resident, but not numerous owing to the scarcity of suitable waters.

IV.—*Note on a remarkable Honey-eater (Woodfordia superciliosa North) from Rennell Island in the Western Pacific.*
By C. M. WOODFORD, C.M.G., late Resident Commissioner, British Solomon Islands Protectorate.

(Plate III.)

SITUATED to the south-east of the Solomon Group in the western Pacific are the two islands marked on the British Admiralty Charts as Rennell and Bellona.

Rennell is situated about ninety miles to the south of San Cristoval, and Bellona is about fifteen miles to the north-west of Rennell.

Both islands are inhabited by natives of Polynesian race, totally distinct from the Melanesian natives of the Solomon Group, and there is no communication between them.

The native name of Rennell is "Mangana," and that of Bellona "Mangiki."

I am informed that the natives of Rennell call the south-west portion of their island "Bethona," and the central

portion "Mangihamoā." The Melanesian natives of San Cristoval, from the mountains of which Rennell is frequently visible, know it by the name of "Totohuke."

Rennell is about 40 to 45 miles in length and not more than about six miles in width. It is about 400 feet high, and almost of uniform height from end to end. It is densely wooded and composed entirely of upheaved coral.

Between Rennell and San Cristoval the German surveying vessel "Planat" in 1910 found a depth of 3762 fathoms*, so it is certain that there has been no land connection with the islands of the Solomon Group within recent times, and it is possible that further surprises, both ornithological and botanical, may be expected when the island is better known.

As there are no anchorages and the currents are strong and uncertain, the two islands have been very little visited.

In 1903 an opportunity occurred which enabled me to visit Rennell in a small cutter which was placed at my disposal by a trader in the Solomons, who accompanied me.

We communicated by boat with the natives at both the western and eastern ends of Rennell, and after considerable trouble and favoured by fine weather, a precarious anchorage was found in an open bay in about the centre of the south coast.

At this particular spot no natives were at first met with, but we found near the beach a dilapidated hut and some graves.

Although I had a gun with me I was reluctant to use it for shooting birds, as the natives we had met, although perfectly friendly, were very shy and at the same time curious and inclined to be thievish.

During a walk through the bush, extending altogether for about three or four miles in two directions, in addition to birds common in the Solomon Group, I noticed the Black-necked Ibis (*Ibis mollucca* Cuvier) settling on high trees in the bush. It appeared to be quite common, and I could certainly have shot two or three; but did not do so for the reason mentioned above.

* See Geographical Magazine, March 1911, p. 321.

The occurrence of this bird at Rennell is very interesting, as after an experience extending to nearly thirty years I have never seen it in the Solomons, nor has it been recorded by others.

Returning to the beach we found three old women, who appeared to be tending the graves, and after they had overcome their first surprise at seeing us emerge from the bush in their rear, they entered into conversation.

At this landing place I found a strange orchid which I sent to Kew, and it was described as a new species under the name of *Saccolabium Woodfordii* Rolfe.

As we were on the point of leaving the island I had no objection to use my gun, and I shot two Honey-eaters, which proved to be of a common species, as well as the bird which forms the subject of the present note.

I sent the bird, in spirit, to the Australian Museum, Sydney, and it was described by Mr. A. J. North in the 'Victorian Naturalist,' xxiii. 1906, p. 104, and a photograph of the skin forms Plate 8 of that volume.

Mr. North's description is as follows :--

"Family MELIPHAGIDÆ.

WOODFORDIA, gen. nov.

Bill equal in length to the rest of the head, nearly straight, broader at the base, deeper than broad at the centre of the apical portion, the culmen distinctly ridged and slightly curved towards the tip. A broad patch in front of the eye and a ring round it bare of feathers, the skin wrinkled, over which is sparingly distributed on that portion in front of the eye, very fine, short white hairs. First primary entirely suppressed, the tip of the wing formed by the third, fourth, and fifth primaries. Tail imperfect, some of the central feathers missing; apparently nearly square, and two-thirds of the length of the wing. Tarsus comparatively thick, covered with a few scales in front, and nearly one-third longer than the bill; feet fleshy and robust.



MENPES PRESS, WATFORD

WOODFORDIA SUPERCILIOSA.

WOODFORDIA SUPERCILIOSA, sp. nov.

General colour above brown, washed with dull olive-green, which is brighter on the lower back, rump, and upper tail-coverts; upper wing-coverts like the back, the quills dusky-brown, externally margined with dull olive-green; tail-feathers dusky-brown, indistinctly margined with dull olive-green; base of the forehead whitish; a broad patch in front and a ring round the eye bare of feathers, above the latter a well-defined white eyebrow; ear-coverts and throat ashy-white; sides of the neck and remainder of the under surface and under tail-coverts dull ashy-white, washed with pale olive-brown; bill yellowish-brown, the under mandible, except at the tip, of a clearer yellow; wrinkled skin in front of, and round the eye blackish; legs and feet light greenish-olive, soles of feet yellow. Total length in the flesh 6 inches; wing 3·0; tail 2·0; bill 0·75; tarsus 0·9.

Habitat. Rennell Island, Solomon Group.

Type in the Australian Museum, Sydney.

The above description is taken from a spirit-specimen.

Owing to its large bill, short tail, thick tarsus, and stout and fleshy feet, I was doubtful even of the family to which this bird belonged until I had examined its tongue, which is deeply grooved down the centre, bifid and brush-like at the tip. One, however, of its chief characteristics is the bare ring round, and the wrinkled skin in front of, the eye, showing an affinity to the genera *Melidectes* and *Meliphotes*, but both of these have the skin on the sides of the face smooth and the bare space larger behind than in front of the eye. In the total absence of the first primary, *Woodfordia* resembles the genus *Zosterops*."

At my request the Curator of the Australian Museum, Sydney, had a drawing prepared for me which has not, up to the present time, been published. I sent this drawing to the late Dr. P. L. Sclater in August 1909, and in returning it to me he wrote: "It is a very curious bird, and I have never seen anything like it." With the help of the photograph and the coloured sketch, Mr. Grönvold has prepared

Plate III., as it seemed worth while drawing fresh attention to this very remarkable bird.

I have visited Rennell twice and Bellona once since the visit above described, in the British Solomon Islands Protectorate Government steamer, but on neither occasion was I able to land.

V.—*Studies on the Charadriiformes**.—III. *Notes in Relation to the Systematic Position of the Sheath-bills (Chionididae).*

By PERCY R. LOWE, M.B., M.B.O.U.

(Text-figures 1-4.)

THAT the true affinities of this extremely interesting group of birds have been a source of perplexity to ornithologists is sufficiently obvious from the literature on the subject, and from the long array of naturalists who have in turn attempted to solve this problem since the time when Forster, the companion of Cook on his second voyage (1772-73), first discovered the Sheath-bill.

Thus De Blainville (Ann. Sci. Nat. vi. 1836, p. 97) says : "After Forster, a great number of naturalists, among whom were Pennant, Latham, Gmelin, Bonnaterre, Illiger, Vieillot, Oken, Temminck, Goldfuss, the Abbé Ranzani, Quoy & Gaimard, Lesson, Wagler, Cuvier, and Isidore Geoffroy St. Hilaire, successively occupied themselves with *Chionis*, and nearly all assigned it to a different position" (Transl.). He then proceeds to state his reasons for considering that the genus in question (the only one then recognised) is most nearly allied to the Oyster-catchers (*Hæmatopus*).

From this point, R. W. Shufeldt, in a review of the opinions on the systematic position of the Chionididae

* In describing the palatal region of the Jack-Snipe in my paper on the Chatham Island Snipe ('Ibis,' October 1915, p. 711), I remarked :—"So far as I am aware, this region in the Jack-Snipe has never been previously described." I regret to say that this was an error, for Mr. F. E. Beddard, F.R.S., had, unbeknown to me, previously called attention to its aberrant nature (cf. P. Z. S. 1901, p. 599).

(‘Auk,’ vol. x. No. 2, April 1893), cites a number of authors* who have taken up the story. Among these may be mentioned Eyton, Cunningham, Alfred Newton, Kidder & Coues, Selater & Salvin, Garrod, W. K. Parker, Reichenow, Forbes, Gray, Sundevall, Wallace, Fürbringer, and others; while, finally, he himself published an illustrated memoir “upon this remarkable type” in the ‘Journal of Anatomy and Physiology’ (London) in July 1891.

It is not my intention to review the various opinions expressed by this last formidable group of authorities, for Shufeldt has already done so in his paper on the subject; but to anyone studying them it must be obvious that any facts, however trifling and modest, which may serve to throw light on the life-history, morphology, and affinities of a remarkable family are acceptable; and this must be taken as my excuse for the following notes.

Remarkable and anomalous as the Sheath-bills are in more ways than one, it is not so much that we are interested in them, as in their relations to neighbouring groups and in the part they may, or may not play in demonstrating the processes of evolution whereby the Skuas, Gulls, Terns, and Auks became differentiated from the main Pluvialine or Limicoline stock.

Did, for instance, these processes of evolution eventuate through continuous or discontinuous variations? Were the various Charadriiform groups or families originally instituted solely through saltations occurring in the germ plasm, or to what extent have environmental or functional stresses been responsible?

I. Geographical Distribution.

As is well known, the present-day distribution of the Chionididae is ultra-southern. There is no evidence derived from fossil remains pointing to the fact that in past ages the group had a more northerly distribution. On this point there is a most complete palæontological blank. The

* Shufeldt gives references to all these papers in the publication just quoted.

range of the family, as at present known, does not extend farther north than the parallel of 45° S. (this is about the meridian of 40° E.), nor farther east than the meridian of 80° E., or farther west than about the meridian of 80° W.

This distribution, it will thus be noticed, only comprises the more extreme southern regions of the Atlantic and the western moiety of the southern Indian Ocean, leaving the eastern part of the southern Indian Ocean and the entire ultra-southern Pacific unoccupied. In other words, of the Antarctic marine belt circumscribing the world in these southern regions, only a sector equal to less than half the entire belt is concerned.

Within the limits defined above, the various species comprising the Sheath-bill family may be divided into two groups; corresponding to the geographical distribution of the two genera which have been differentiated. These two groups may be called the *Chionis* group and the *Chionarchus* group, and their distribution, as at present known, is as follows :—

(1) The *Chionis* group.—Birds belonging to this genus have been recorded from the extreme southern portions of South America, comprising part of the southern coast-line of Patagonia, the Straits of Magellan, Tierra del Fuego, and Staten Island (the type-locality of *Chionis alba*). They have also been recorded from the Falkland Islands (? breeding), South Georgia, the South Sandwich group, South Orkney, and Booth-Wandel Island (Graham Land).

(2) The *Chionarchus* group.—Species belonging to this group have been recorded from Kerguelen Island, Prince Edward's Island, Marion Island, Heard Island, and the Crozets.

Thus Notogæa and its southern continuations is, at any rate at the present day, entirely left out of account; for the evidence of the occurrence of the Sheath-bill in New Zealand waters was certainly founded on error. It may be also stated that in the large collection of fossil bird-remains collected by Dr. H. O. Forbes in the Chatham Islands, that

well-known authority has found no evidence pointing to its former residence there, and the same deduction applies to Lord Rothschild's collections from the same locality in so far as they have been worked out. Nor has the Sheath-bill been recorded on any of the expeditions entering Antarctica by way of Queen Victoria or Edward the Seventh Lands. From what has been written of Antarctica as a connecting-link between South America and Australasia, such a limited distribution in Antarctic seas is interesting.

Osteologically the two groups above mentioned are characterised by perfectly obvious differences, which are, however, practically confined to the skull. There are also very obvious and distinct differences in more superficial characters, such, for instance, as the wattling and carunculation of the face, the colour of the soft parts, the arrangement of the horny sheath embracing the upper mandible, and the presence or absence of bare spaces on the side of the face.

In spite of such manifest generic differences, Milne-Edwards (Ann. Sc. Nat. ser. 6, xiii. 1882, art. 4, p. 24) has expressed the opinion that generic differentiation between these two groups is unnecessary and uncalled for. In connection with such a question it is probably not generally realized that the distance separating the nearest points of the territorial limits proper to the two groups is something in the neighbourhood of 4500 miles, a distance which would appear to be adequate enough for the deep-seated effects of isolation. Even from the Crozets to Kerguelen the distance works out at something like 1500 miles.

As regards the southern limits to which the distribution of the family extends, it would appear that these are roughly represented by the Antarctic circle, beyond which it seems doubtful if the birds range. In the 'Ibis' (1895, p. 165) there is a note by Tristram to the effect that a specimen of "*Chionis*" was obtained by Dr. Gunn, surgeon on the 'Terror' during the Ross Antarctic Expedition, in latitude 78° S. Eagle Clarke ('Ibis,' 1907, p. 349) records that it has been proved that Gunn was never in such a latitude, so

that there seems no doubt but that this record was founded on error. In addition to this, no example of *Chionis* has ever been recorded by any of the expeditions which have explored the Antarctic continent in the neighbourhood of Ross Bay, Victoria Land, &c.; so that the Booth-Wandel Island record, off Graham's Land in 65° S. lat. (French Antarctic Expedition), probably represents the farthest southern limit up to date. In addition to these land-records, representatives of the family have been met with far out at sea, many miles from land. Thus Eagle Clarke (*l. c.*) records that on the voyage of the 'Scotia' (Scottish National Antarctic Expedition), while the vessel was midway between the Orkney and Sandwich group, that is to say 300 miles from land, Sheath-bills (*Chionis alba*) were observed, the exact position being $59^{\circ} 44'$ S. and $36^{\circ} 40'$ W. According to observations made on the 'Scotia,' *Chionis alba* does not appear to penetrate into the Weddell Sea, and the most southerly point at which it was observed on this expedition, was 61° .

II. *Life-history and Habits of the Sheath-bills.*

Observations on these may be found in the 'Philosophical Transactions of the Royal Society,' vol. clxviii. 1879; in a paper by Kidder & Coues (Bull. U.S. Nat. Mus. No. 3, 1876); in an article by Alfred Newton in the 'Encyclopædia Britannica' (9th Ed.); in another by Prof. T. H. Studer of the University of Berne (C. R. Congr. Orn. iii. pp. 275-276); in the report by Menegaux on the Birds observed and collected on the French Antarctic Expedition (Exp. Antare. Franç. 1903-5, Oiseaux, 1907); and in a recent and most interesting account of these birds compiled by Eagle Clarke from the records of the naturalists of the Scottish Antarctic Expedition ('Ibis,' 1906, p. 182).

With this bare allusion to some writers on the subject under notice I should have been content, were it not for the fact that certain points in the life-history and habits of the Sheath-bill would possibly appear to bear on the question of its affinities, and were it not also for the fact that certain statements which have been made in connection

with this subject seem to call for comment. Prof. Studer (*l. c.*), for instance, has stated that the horny sheath which embraces the base of the upper mandible protects the nasal orifices when the bird is feeding on the eggs of Cormorants and Penguins, of which it is very fond. That this is a physical and anatomical impossibility will, I think, be apparent to anyone who has examined the bill of a Sheath-bill. Moreover, this sheath varies in its morphology, not only in different genera, but in different species of the same genus, e. g. *Chionarchus*.

The same author also states that the chick on hatching is blind (that is to say that the eyelids are unopened). Prof. Studer, I presume, is simply quoting from information supplied to him, but unfortunately does not give his authority. The question is a very interesting one, because if the young of the Sheath-bills are in truth "blind" on hatching, we have a very anomalous condition, since, so far as I am aware, there is no other proved instance of it in the Waders. From an examination of a fine series of embryos of *Chionarchus minor* collected during the 'Challenger' Expedition (1873-6), and which are preserved in spirit in the British Museum collection, I at first came to the conclusion that the condition of the eyelids (which were in all cases open) proved beyond doubt that the chick is *not* "born" blind. However, since reading a paper by Dr. Casey A. Wood* on "The Eyelids and Lacrymal Apparatus of Birds" ('Ophthalmology,' Seattle, U.S.A., July 1915), I have to acknowledge that the open-eyed condition in the embryo-chick appears to prove nothing of the sort. Dr. Wood, for instance, says: "Unlike man and many other mammals, there is no true union of the conjunctivæ of the two lids before a bird is born. In the Sparrow (probably in all the Passeriformes) the lids are wide open during embryonic life, but as soon as the bird is hatched the eyes are closed, and remain closed for several days. There is no evidence that any organic union occurs between the lid-margins in these 'born-blind' birds. In all probability the closed eyes

* See also notice on p. 174.

are due to tonic contraction of the orbicularis as a light-reflex act."

I have examined the margins of the lids in certain Passeres (embryonic or just hatched), and, as Dr. Wood states, there does not appear to be any signs in the epithelial covering of these margins pointing to any organic union. It would appear, therefore, that we cannot predict from a mere inspection of the embryonic avian eye whether its possessor will or will not be "blind" in the first days of its existence after hatching.

Eagle Clarke (*l. c.*) also states that "the newly-hatched young (of *Chionis alba*) are clad in brown down *with conspicuous bare patches*" (*italics mine*). Possibly these bare patches were only evident before the down had thoroughly dried out after hatching; for in a chick which I took out of spirit (see above), and which had been either on the point of hatching or only just hatched, no bare patches were evident after the down had dried, although, before this took place, bare apteria, devoid of any sort of downy feathering, were evident.

I mention this because, from the various accounts of the nestlings which I have read, with the exception of Prof. Studer's, just alluded to, it does not appear clear whether or no the chick is nidicolous or nidifugous. If the Sheath-bill is a pure and simple Limicoline bird, one would expect it to be nidifugous; if, on the other hand, it is partly Larine, it might be for some time nidicolous. The chick of *Dromas*, a form which presents several Larine characters, is, for instance, nidicolous, but this may be due to force of environment. From remarks made by Menegaux in his report on the Birds of the French Antarctic Expedition (Exped. Antarct. Française, 1903-5), it would appear, by inference, that the chick stays for a long time in the nest.

Eagle Clarke (*l. c.*) states that "Sheath-bills were seen to revel in garbage of every description, including the excrement and placenta of seals. They are well known to be very fond of the eggs of Penguins and Shags, which they

break open and feed on, while they have actually been seen to rob sitting birds. This is mentioned by Eagle Clarke, Menegaux, and Eaton (Phil. Trans. Roy. Soc. vol. clxviii.). Such habits are sufficiently surprising in a Wader, and are more reminiscent of a Skua or a Gull.

On a pap formed of the placenta of seals, the contents of eggs, and small crustacea (Isopods), on which the Sheath-bill also feeds, one could well imagine that the young are nourished by the parents for some time and while still in the nest. Eaton records that the Sheath-bill also feeds, between tide-marks, "on mussels, enteromorpha, and ulva."

The birds nest in colonies on the edge of Penguin or Shag rookeries, the nests being "placed in crevices of rocks or underneath boulders on the moraine," sometimes ten or twenty feet only above sea-level, at other times a good deal higher up. One was found during the Scottish Expedition, 100 feet up on a moraine and "right in the midst of the Penguins" (Eagle Clarke). The nests were mainly composed of the shells of Penguins' eggs, bones, feathers, and a number of limpet-shells (Eagle Clarke). Eaton (*l. c.*) says: "The nest is a simple construction without a lining, and consists of a heap of dried seed-stalks of *Pringlea antiscorbutica* or tufts of *Festuca erecta*. Occasionally old burrows of *Prion* or *Halobæna* are occupied." In the South Orkneys the birds were migratory, and, in the main, only visited these islands to breed. During winter only some twenty or thirty remained and "eked out an existence on the refuse odds and ends which were daily thrown out from the 'Scotia'" (Eagle Clarke); a proceeding, it may be added, which does not suggest the habits of the normal Wader.

III. *Pterylography*.

- A. Embryo of *Chionarchus minor*, nearly ripe, obtained from Kerguelen Island on the 'Challenger' Expedition and now in the collection of the British Museum.

The type of down-feathers presented by this and all the embryos I have examined is prepennal only. These prepennal down-feathers are disposed in well-defined and

strong pterykæ or feather-tracts, which are very clearly seen in the accompanying drawings. In the embryo the apteria are conspicuous, but when the prepennal down-feathers have dried after hatching they are apparently hidden, judging only from what takes place in spirit-specimens. The apteria are conspicuously bare and smooth, with not the least sign of preplumule. In coloration the prepennæ are greyish brown, lighter towards the base, darker at the tips of the rami, where they end in long thread-like filoplumes devoid of radii. These prepennæ have the typical structure described by Mr. W. P. Pyecraft*, but, judging from the banded appearance of the radii, these seem to be furnished with strong fila. The microscopic details will be described in a forthcoming paper on *Dromas*.

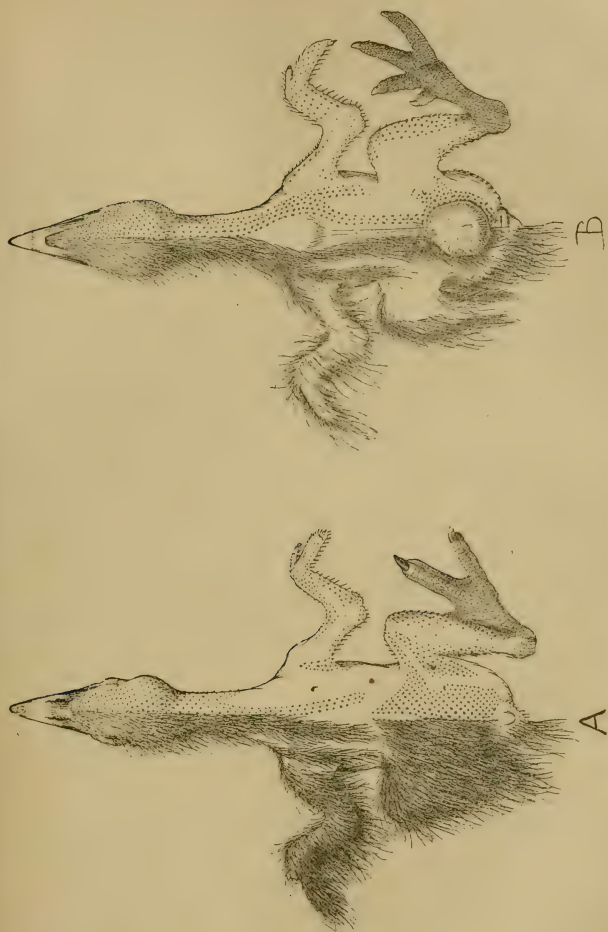
As regards the feather-tracts, these are depicted so clearly in the illustrations that no very detailed description seems necessary.

The *Pteryla capitis* is strongly marked, and evenly distributed over the vertex, sides of the face, and inter-ramal region.

The *Pt. colli* splits slightly more than halfway down the neck into a dorsal and ventral tract, both strongly marked. At about the level of the acro-coracoid the dorsal tract (*Pt. colli dorsalis*) splits into a strongly marked fork, the two ends of which terminate about the level of the tip of the scapula. There is a distinct break here in what has been described as the spinal tract, so that what might be looked upon as the dorsi-sacral tract appears to have an independent existence (*cf.* text-figure 1 A). This dorsi-sacral tract is strong; it is narrowly bifurcated at its proximal extremity, and does not appear to be so constricted at its termination at the base of the uropygium as is usual in the Waders. It will be noted that laterally it extends well outwards along the anterior margin of the femur. The

* "Contributions towards our Knowledge of the Pterylography of the Megapodii," Willey's Zoological Results, pt. iv. Camb. Univ. Press: April 1900. (See also Brit. Birds Mag. vol. i.)

Text-figure 1.



Embryo of *Chionarchus minor* to show the distribution of the down and feather tracts.

A. Dorsal view.

B. Ventral view.

femoral tract (*Pt. femoralis*) is strongly defined, and has the shape of a scalene triangle.

The humeral tract (*Pt. humeralis*) is sharply defined and calls for no comment.

The uropygium is not tufted. The orifice of the gland is merely indicated by an invagination of the skin. It is not prolonged in the form of a nipple. There are twelve tail-feathers with twelve coverts.

The ventral tract (*Pt. ventralis*) splits as usual (in the Waders) into a median and a pectoral division (see text-figure 1 B). Except that two divaricate extensions of the median tract towards the inguinal region may be observed, it calls for no comment.

Rhamphotheca. The curious horny sheath so characteristic of the Sheath-bills is in the embryo observed to be concrete with the horny substance of the bill, being only indicated by a faint line of demarcation.

Podotheca bare, reticulate.

Claws. There is a distinctly visible claw on the pollex. Those of the toes are strong, blunt, and galline in appearance.

Toes slightly webbed at their bases, with a lateral fringe-like extension of the podotheca.

Summary.—Pterylosis limicoline*, presenting its own slight peculiarities and no gallinaceous traits. Nitzsch says *Chionis* has exactly the pterylosis of *Recurvirostra*. Unfortunately I have been unable to secure any embryos or adults of *Recurvirostra*, *Hæmatopus* or *Stercorarius* with which to make a comparison with the pterylographical features of *Chionarchus*. There are well-marked points of distinction in comparison with the pterylosis of *Larus*, which I have carefully examined. In general appearance the chick of *Chionarchus* is very Skua-like. The coloration of the down is a uniform smutty brown with no indication of pattern whatever, except that the head is lighter in colour than the rest of the upper parts and the under parts dirty white.

* Using the word limicoline in a broad sense.

B. *Chionis alba*. Immature example, half-fledged; from Laurie Island, South Orkneys (Jan. 1904). In the collection of the National Scottish Museum, Edinburgh.

This interesting specimen was very courteously sent to me for examination by Mr. Wm. Eagle Clarke. It has already been illustrated in 'The Ibis' for Jan. 1906, but the accompanying illustration (text-figure 2) depicts it in greater detail and from a different aspect. Considered as an example of a young Wader, it presents what one might almost describe as a weird appearance. The following notes seem, in view of the aberrant nature of the Sheath-bills, to be worth recording:—

Nestling, half-fledged; no indication on label of its probable age. The plumage consists of neosoptiles and teleoptiles, with no indication of mesoptiles. The neosoptilic feathers may be again subdivided into prepennæ and preplumulæ.

(a) *Teleoptiles*.—White definitive or contour-feathers, apparently similar to fully adult contour-feathers, are to be observed on the wings (primary and secondary remiges and coverts); in the tail, where they are not so strongly developed as on the wing; over the scapular region (so-called humeral tract); in the mid-scapular region (corresponding to the forks of the anterior spinal tract and forming the mantle); over the rump and uropygium (corresponding to the posterior spinal tract); and in the region corresponding to the femoral tract (not shown in the drawing).

On the ventral surface, white contour-feathers may be observed on the whole of the fore-neck and upper breast, just forcing their way through a thick growth of bluish-grey down (preplumulæ), which latter is very conspicuous. On the lower breast, flanks, and abdomen white contour-feathers are more conspicuous still, and are tipped with greyish-brown prepennæ.

(b) *Preplumulæ*.—Conspicuous bands or tracts of these feathers are seen along the preaxial borders of the wings, and in tracts apparently corresponding to the *Apteria spinale*, *A. colli laterale*, and *A. trunci laterale*. Towards

the flanks they are replaced by prepennæ, which are still attached to the rapidly-growing contour-feathers. They have already been described as conspicuous on the fore-neck and breast.

Text-figure 2.



Chionis alba. Nestling half-fledged, from above.

(c) *Prepennæ*.—These are most conspicuous at the ends of the wing-coverts, tail-feathers, over the thighs and legs (femoral and crural tracts), and on the flanks. A few may be seen over the fore-neck and breast.

On the head (vertex) and back of the neck prepennæ

down feathers are conspicuous, but are somewhat degenerate in structure. As regards the vertex and occiput, they are chiefly disposed towards the sides, the mid-region of these parts being occupied with preplumulæ. The prepennæ extend forwards on the head to the supraocular region of each side. Degenerate prepennæ are seen on the chin and below the malar region. A bare space (? colour in life) surrounds the eye, and another bare space is to be noted over the malar region.

Bill hard and well-developed; sheath ill-developed, nearly concrete with rhamphotheca.

Legs, feet, and claws extremely well-developed, and in size appear to be out of proportion to apparent age of the bird; claws like the claws of an adult Grouse in point of strength and development.

This young bird is obviously older than it looks at first sight, and the young of the Sheath-bills are evidently nidicolous.

Adult Sheath-bills.—As is well known, the plumage of the adult Sheath-bill is of uniform pure white colour, and the general appearance of the bird is much like that of a Ptarmigan. In the Ptarmigan and other Arctic animals the white (winter) plumage is, or has been, generally regarded as procrryptic and as affording protection from enemies amidst a snow-covered environment. In the case of the equally white Sheath-bill, it is interesting to reflect that there are no birds of prey in the Antarctic Islands or any carnivorous land animals. Indeed, from all accounts the Sheath-bill itself is something of a bird-of-prey in a small way.

In Antarctic latitudes the chief "bullies" are the Skua and the Albatros, more especially (as Mr. Ogilvie-Grant informs me) *Macronektes* (= *Ossifraga*). In connection with this question of what possible use it can be for the Sheath-bill to have a pure white plumage, Mr. Grant tells me that *Macronektes giganteus* has two phases of plumage coloration, a white phase and a dark grey phase, which

have nothing to do with seasonal change. Moreover, these distinctive phases are distinguishable in the young in down. For instance, Mr. Grant showed me two young, said to be eight weeks old, taken by Mr. Bennett from the same colony on the South Orkneys, which are especially interesting, one being pure white (both as regards neossoptyles and teleoptyles) and the other dark slaty-grey—the grey in this case also affecting both the down-feathers and the contour-feathers, which had already come through, although the down-feathers were not so dark as these latter.

IV. *Genera and Species of Chionididae.*

A. CHIONIS Forster, Enchiridion Hist. Nat. 1788, p. 37.

Type, *C. alba*.

Species:—

(a) CHIONIS ALBA (Gm.), Syst. Nat. i. 1788, p. 705 :
New Year Island (coast of Staten Island).

B. CHIONARCHUS Kidder & Coues, Bull. U.S. Nat. Mus.

No. 3, 1876, p. 116. Type, *C. minor*.

Species:—

(a) CHIONARCHUS MINOR (Hartlaub), Rev. Zool. for
1841, 1842, p. 5: type-locality unknown.

Type in the Leyden Museum.

It appears doubtful whether, as is generally stated, the Kerguelen Island Sheath-bill is identical with the bird named by Hartlaub *C. minor*. Hartlaub, in his original description, gives its location as “country unknown,” and describes it as *distinctly smaller* than *C. alba*. As a matter of fact, skins of Sheath-bills from Kerguelen Island give measurements which are quite as large as those of *C. alba*.

The following comparative measurements, taken from the skeletons of the two forms, may also be quoted:—

(1) Sternum, length (over all)—	<i>Chionarchus “minor”</i> . .	67 mm.
” ” ”	<i>Chionis alba</i>	64 mm.
(2) Humerus—	<i>Chionarchus “minor”</i>	74 mm.
”	<i>Chionis alba</i>	71 mm.

- (3) Femur *Chionarchus* 60 mm. *Chionis* 55 mm.
 (4) Tarso-metatarsus „ 49 mm. „ 43 mm.
 (5) Middle toe „ 48 mm. „ 39 mm.
 (6) Skull:—

(a) From occipital protuberance to tip of premaxillæ—

(1) *Chionarchus* "*minor*" 70 mm.

(2) *Chionis alba* 65 mm.

(b) Transverse diameter from tips of post-orbital processes identical in the two forms.

(c) From tip of premaxillæ to end of nasal processes of the same.

(1) *Chionarchus* "*minor*" 35.5 mm.

(2) *Chionis alba* 30 mm.

From which data it will be noticed that, far from *Chionarchus* "*minor*" being the smaller bird, it is, in fact, actually larger. It seems therefore probable, if not certain, that Hartlaub's *C. minor* did not hail from Kerguelen Island, and the deduction is that it must have come from either Marion Island or from the Crozets. (I have not seen a skin from Heard Island = *C. nascicornis* of Reichenow.) Both the Marion Island and Crozet forms are very obviously smaller than *C. "minor"* from Kerguelen. It is also obvious that further remarks would be useless until the type of *C. minor* in the Leyden Museum has been examined, which at the present time is impossible.

(b) *CHIONARCHUS MARIONENSIS* (Reichenow), Deutsche Süd-Polar Exp. i. 1908, p. 566.

Type-locality—Marion Island (Prince Edward Island, Southern Indian Ocean).

(c) *CHIONARCHUS NASCICORNIS* (Reichenow), Ornith. Monatsb. xii. 1904, p. 47.

Type-locality—Heard Island (Southern Indian Ocean).

(d) *CHIONARCHUS CROZETTENSIS* (Sharpe), Bull. B.O.C. v. 1896, p. xlv.

Type-locality—Crozet Islands (Southern Indian Ocean).

Type in Brit. Mus.

V. *The Comparative Osteology of the Chionididæ.*

In the many papers which have been written on the subject of the anatomy and affinities of the Sheath-bills, so much stress has been laid on the affinities of these birds with the Oyster-catchers (*Hæmatopodidæ*) that attention has been apparently distracted from certain Skua-like features in the skulls of this group. In the following notes (of a somewhat general character) I shall endeavour to demonstrate these Skua-like features; but just as I believe that such Oyster-catcher-like characters as are presented in the skeletal features of the Sheath-bills are not necessarily evidence of close affinity, but may have been impressed on them through functional or environmental stresses or through mere parallelism, so I would not be taken as implying that because in the skull of the Sheath-bill there are certain features which bear a strong resemblance to similar features in the skull of a Skua, that this necessarily implies that the Sheath-bills are more closely related to the Skuas than to any other Charadriiform group (see also Summary). Incidentally I shall hope to demonstrate that the gap which separates the Skuas (*Stercorariidæ*) from the Gulls (*Laridæ*) is much greater than has apparently been hitherto suspected.

Finally, there is another point to which I think attention should be drawn. There is a somewhat time-honoured belief that gallinaceous and columbiform characters are reflected in the osteological peculiarities of the Sheath-bills. For this belief and for the statements which have been made in this connection, there appears to be no real evidence at all. If the Sheath-bills possess any gallinaceous or columbiform features at all, they are concerned with the most superficial characters.

The Skull.

Occipital Region.—The occipital condyle is circular (not bi-lobed as in *Gallinæ*), and a distinctly constricted neck is to be observed. The occipital foramen (foramen magnum)

is somewhat rounded as in both the Gulls and Skuas—the transverse diameter being longer than the sagittal. The plane of the whole occipital area, including the plane of the foramen magnum, makes a sharp angle with the basal plane of the skull (a larine and Skua character). As a consequence, these planes look distinctly backwards as well as downwards. In *Hæmatopus* the plane of the foramen magnum looks directly downwards; and the same is nearly true of the pluvialine genera *Charadrius* and *Squatarola*. The supraoccipital ridge does not sweep forwards and downwards to become merged in the inner border of the paroccipital process, but ends abruptly in the middle of either margin of the occipital foramen as two rather prominent spinous processes, on the outer sides of which is a distinct and well-defined groove (for the exit of the sinus canal). These processes are not nearly so prominent in *Hæmatopus*. The arrangement in *Charadrius* is somewhat different, the groove just mentioned being partly bridged.

The lambdoidal ridge is not so sharply defined as in the Laridæ. It is thicker and more osseous, and instead of being continued outwards, forwards, and downwards as a sharply defined ridge to run into the outer border of the paroccipital process, it sweeps abruptly inwards as a thickened rounded and more osseous ridge to terminate near the aforesaid processes on either side of the foramen magnum. As a result, the occipital area is divided in the Chionididæ into two distinct and hollowed surfaces separated by a prominent ridge, and the identity of the supraoccipital and exoccipital bones (which are separate entities in the embryo) is thereby rendered more obvious (*cf.* figures). This appears to be a pluvialine character, as it is to be noted in *Charadrius*; but it is more exaggerated in the Sheath-bills. An interesting fact to note is that it is to be observed in *Stercorarius crepidatus*. It is indicated in *S. parasiticus*, and also in *Hæmatopus*, but is hardly present in *Megalestris (antarctica)*, which appears to be a more specialised stercorarine genus than the rest. In the Gulls (Laridæ) the separate identity

of the supraoccipital and exoccipital is completely obliterated. There are no supraoccipital fenestræ. These are also absent in the Skuas and Gulls. They are present in *Hæmatopus* and the Plovers (Limicolæ).

Parietal Region.—Comparing this region with that of the true Gulls (Laridæ) the absence of the deep and conspicuous temporal grooves is at once obvious. Without entering into details, it may be pointed out that the general configuration of the fronto-parietal region in the Sheath-bill genera is quite peculiar (*cf.* text-figure 3), the vault of the skull frontal-wards being prominent, smooth, and high, without any evidence of sagittal grooving. The morphology of this region differs widely, in fact, from that peculiar to the Gulls or Charadriidæ. A very interesting point is here to be noted, viz., that the deep and prominent temporal grooves so conspicuous in the Laridæ are (as in the Chionididæ) completely missing in the Skuas, a fact which appears to have been hitherto overlooked. These deep temporal fossæ are, for instance, generally quoted as being distinctly larine characters, the word *larine* being used in a wide sense so as to include the Skuas. As a matter of fact, the depressions for the attachment of the temporal muscles in the Skuas, small in extent as they are, and strictly limited to the sides of the skull (squamosal region, etc.), are even smaller than in the Chionididæ; and in their position and limits are distinctly pluvialine. To be quite exact, however, this only applies to the genus *Stercorarius*, since in *Megalestris* we get a stage somewhat intermediate between *Stercorarius* and the Gulls proper, although even in *Megalestris* the surfaces for the attachment of the temporal muscles still remain shallow and ungrooved. The importance of these so-called larine grooves as characters which have any real significance in relation to affinities is thus very distinctly diminished, for their presence or absence appears to be more or less a matter of functional stress, or dependent upon the use to which the temporal muscles are put in the process of obtaining food.

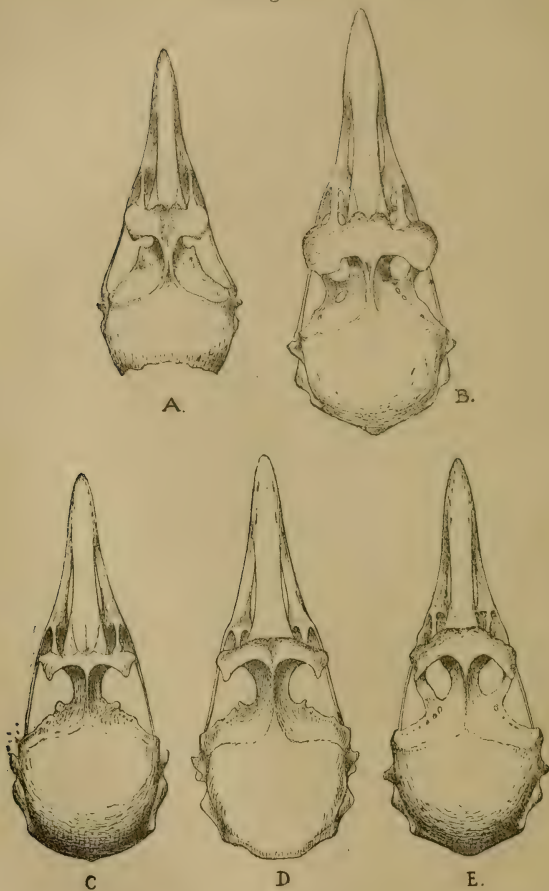
In any case, however, we must be cautious in drawing deductions as to affinity from the resemblances noted in the parietal region in the Sheath-bills and the Skuas, for this might indicate that it was rather that the Skuas were more Plover-like than the Gulls than that the Sheath-bills were more Skua-like than the Plovers.

A word may be added in connection with the general shape and configuration of the fronto-parietal region in the Sheath-bills. Shufeldt (Journ. Anat. & Phys. Lond. vol. xxv. 1891, p. 509) has thus expressed himself upon it: "As for the vault of the skull and the greater portion of its posterior aspect, particularly the supraoccipital region, it is all strongly gallinaceous in the Sheath-bill, and strikes us at once upon the most superficial examination." Such a similarity, whether it exists or not, would not appear to have much importance one way or the other, but I am obliged to confess that personally I have failed to see the resemblance. As an indication of any gallinaceous affinity in the Sheath-bills, the statement seems to call for criticism, and to be misleading.

Frontal Region.—The morphological details of this region will be more obvious from an inspection of the accompanying text-figures than from any amount of written description. These text-figures depict the skulls of various numbers of the Sheath-bill family as seen from above. Three of them represent skulls of *Chionis alba*, in which we observe variation due apparently to age and ossification, or very possibly to the influences of isolation; another represents the skull of *Chionarchus minor*, and another the skull of *Chionarchus crozettensis*.

As is obvious from the figures, the main features of this aspect of the skulls of the Sheath-bills are the strongly marked and deep supraorbital depressions, which are merely separated in the middle line by a thin sagittal ridge, and the very peculiar and distinctive shield-like lacrymals. As regards the supraorbital depressions, these, in form and structure, are obviously modifications of what is seen in the

Text-figure 3.



Dorsal view of the skulls of:—

- A. *Chionarchus crozettensis*; B. *C. "minor"*;
 C. "*Chionis alba*, bought of Mr. Thompson"; D, E. *Chionis alba*.

Skuas, Gulls, Oyster-catchers, and *Dromas* (Crab-Plover), or, to be probably more exact, they are modifications of these structures, as they were possessed by an ancestral form from which all the groups above mentioned have possibly sprung by discontinuous variations.

Just caudad of the projecting lacrymals there is a prominent sickle-shaped notch with smooth and rounded edges, and this may be converted by a bony bridge into a complete foramen or left incomplete.

It is interesting to note that in the case of the Skuas this notch may also be bridged across by well-organised osseous connections which appear to be something very distinctly more than ossified ligaments; but this, so far I am aware, only applies to the genus *Megalestris*, and even in that genus to New Zealand types only. I have not found a skull of *Stercorarius* in which this notch is converted into a complete foramen.

Thus in both the *Chionis* and *Chionarchus* groups, as well as in the Skuas, we find skulls indicating transitions as regards this supraorbital region, from a more generalised to a more specialised condition, unless, indeed, these progressive steps are simply indications of age.

It would appear, however, judging from the various localities from which these skulls have been collected, that the effects of isolation in this connection cannot be ignored; but until a far greater series of skeletons is available it would be dangerous to draw any conclusions. Attention, however, is especially drawn to the differences presented in the morphology of this region in the case of the skulls of *Chionarchus minor* and *C. crozettensis*, especially as regards the shape of the lacrymals (*cf.* text-figure 3). In passing, attention is also drawn to the fact that in the genus *Chionis* the sagittal ridge separating the supraorbital depression is single. In *Chionarchus* it is double.

Shufeldt (*l. c.*), writing of these notches, says: " Their form in *Chionis* agrees best with *Hæmatopus*, but in *Hæmatopus* the foramina are not entire, their lateral margins having given

way converting them into deep notches." As will be seen by a reference to the figures, the notches in the genus *Chionis* may or may not be converted into complete foramina, and the same applies to the genus *Chionarchus*, so that it does not appear to be a question of the lateral margins having "given way" in *Hematopus*, but rather that they are not so specialised, or do not have the same tendency to specialise, as in the Sheath-bills (or Skuas). In my opinion, however, the form and general configuration of the notches and supraorbital depressions agree best with *Stercorarius*, but one might almost as well have compared them with any of the aberrant Plover-like forms already mentioned, and not only with these but with *Squatarola*, in which we can observe a more generalised but still fundamentally similar condition appertaining to these supraorbital grooves and the notches under discussion.

As regards the lacrymals, the orbital portions of these in the Chionididæ present considerable variation both in form, structure, and size, corresponding not only to generic differences but also to intra-generic variations. They are quite peculiar to the group, but there is a skull in the Natural History Museum of uncertain locality, and labelled "*Chionis alba*, bought of Mr. Thompson," in which the lacrymals appear to be of a more generalised form and to come rather close to those of *Hematopus* (cf. text-figure 3 C).

In *Chionis* the lacrymals are distinctly pneumatic, and there is a varying amount of hyperostosis. In *Chionarchus* the lacrymals are flat plate-like structures. The descending processes of the lacrymals in the Sheath-bills are somewhat abortive, but pluvialine in form and structure. It may be noted here that these processes in the Skuas and Gulls are sharply contrasted. In the Gulls (Laridæ) the descending process of the lacrymal makes a very sharp angle with the orbital process, and approaches the *middle* or *lower* portion of the outer edge of the antorbital plate from a long way distad of it. In the Skuas the angle made is a right angle, and the descending process passes perpendicularly to the *upper* angle of the outer edge of the antorbital plate. In

the Gulls, moreover, the antorbital plate has its extero-inferior angle continued downwards and outwards to a pointed process. In the Skuas the antorbital plate is right-angled in shape.

The "pointed process" of the antorbital plate in the Gulls is apparently reminiscent of "a structure of intense interest" referred to by Prof. W. K. Parker (Trans. Linn. Soc. Lond. 2nd Ser. Zool. vol. i. pt. iii. 1876, p. 150) as the "os uncinatum."

In *Hematopus* the morphology of the lacrymals and antorbital plates is quite peculiar to itself and very different from the arrangement seen in the Chionididæ, in which, as has been indicated, these antorbital plates are not ossified.

Shufeldt (*l. c.*) sees gallinaceous characters in the lacrymals of the Sheath-bills. He says "they are very much like what they are in the Fowls, agreeing with these elements as we find them in any Grouse of the first year, but lacking the peculiar descending spine-like processes of the adult birds; thus both in *Chionis* and the Fowls we find the aborted antorbital plates to be in the same case." At the risk of appearing hypercritical, I am obliged to dissent strongly from this point of view, since statements of such a nature, coming from so well-known an authority, are unfortunately copied and perpetuated. In the first place, it may be bluntly stated that it would be difficult to find such strongly differentiated lacrymals as those characteristic of the Chionididæ and Gallinæ; while, in the second place, we find aborted antorbital plates in the *Œdicnemidæ*.

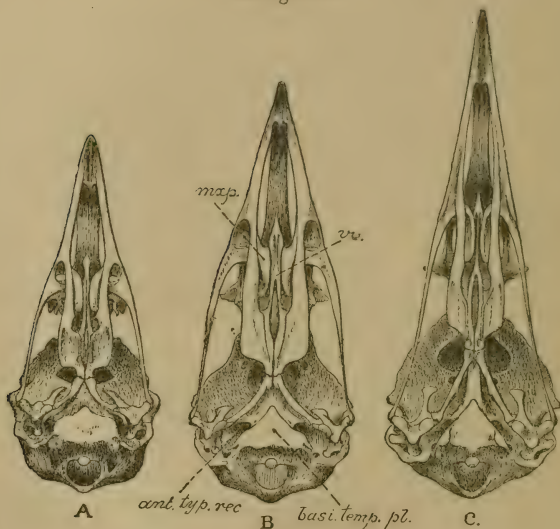
Base of the Skull.

A glance at the accompanying text-figures reveals the fact that, in a general way, the morphology of the basal structures in the Chionididæ come closer to the Skuas than to any other group.

In the Chionididæ the mammillated processes at the base of the basi-temporal plate are more prominent than in the

Stercorariidae, but in both these groups we miss the very prominent and conspicuous downwardly-projecting tubercles at the postero-external angles of the basi-temporal plate, which are so characteristic of the true Gulls. Thus in this respect the Sheath-bills and Skuas are pluvialine, the

Text-figure 4.



Palatal views of the skulls of :—A. *Chionis alba* ;
B. *Stercorarius crepidatus* ; C. *Larus canus*.

ant. typ. rec., anterior tympanic recess ; *basi. temp. pl.*, basi-temporal plate ; *max.*, maxillo-palatine ; *vo.*, vomer.

postero-external angles of the basi-temporal plate ending in outwardly-projecting and spiculate processes. The basi-temporal and basi-occipital region in the Gulls and Skuas are strongly contrasted. The Skuas come close to the Sheath-bills in respect of the morphology of this region. In

the underlap of the apical portion of the basi-temporal plate and the arrangement of the eustachian tubes the Skuas present larine features, the Sheath-bills modified pluvialine ones. Shufeldt (*l. c.*), whom I am once again obliged to quote, states that the basi-temporal region in the Sheath-bills is strongly gallinaceous. This is a statement which I feel convinced could only have crept into the author's manuscript in error, so very far from the actual truth does it appear to be. As regards the palatal plates, pre-palatal bars, maxillo-palatine processes, maxillary processes, and the fenestræ distad of these last—all these, with the exception of the palatal plates, come closer to the like structures in the Skuas than to those of any other Charadriiform groups. The similarity of the arrangement of the maxillo-palatine processes and the presence of the fenestræ distad of the maxillary processes (*cf.* text-figure 4) in both the Sheath-bills and Skuas is very striking, as are also the disposition of the maxillary and palatal processes of the premaxillæ and the form and shape of the maxillo-jugal bars. In the Gulls (*Laridæ*) the fenestræ just alluded to are absent (*cf.* text-figure 4 C), while the morphology of the maxillo-palatine processes is strongly differentiated from the Skuas. As regards the maxillo-palatine processes, Shufeldt (*l. c.*) states that these "in *Chionarchus minor* are much like these bones as we find them in some of the Pigeons." I have been through a fair series of Pigeons' skulls in the collection of the British Museum, and I cannot trace the slightest resemblance between the maxillo-palatines in the two forms, nor can I discover any trace of columbine characters in the osteology of the *Chionididæ*. Referring to the palatal plates once more, these in the Sheath-bills, Gulls proper, Skuas, Oyster-catchers, and Crab-Plover (*Dromas*) present their own peculiar and respective characters. Those of the Sheath-bills appear to have been much specialised, along with those of *Hæmatopus*, away from the more generalised pluvialine type. There seems to be a Woodcock-like element in both, but this shortening-up of the plates in *Hæmatopus* and

Scolopax may be due to crowding, consequent on the rotation which has occurred in the skulls of these two forms.

Premaxillæ.—I fail to see any real gallinaceous characters in these. There is a certain superficial resemblance to a gallinaceous form of bill in the Sheath-bills, but this, I take it, is the outcome of functional stress, and is merely convergent in nature. The general shape of the upper mandible in the Sheath-bills has been evolved to suit a particular method of feeding, and is strictly peculiar to them among the Charadriiformes; but if any comparisons are to be made, they must be made with reference to the bill of the Skuas, which they seem to approach closer than to any other charadriiform type. It must be remembered that the Sheath-bills live amidst rocky, stony, and more or less frost-bound surroundings. They “pick” their food, and do not bore for it like the Scolopacidæ.

It might be as well to state here that the nostrils of the Chionididæ are not holorhinal, as has been stated in the Catalogue of Birds, vol. xxiv. p. 710, evidently through a slip. As is, of course, well known, those of the Gallinæ are holorhinal.

Quadrate.—This bone presents its own peculiar features characteristic of the group, but in the length and form of its orbital process it presents a similarity to that of the Oyster-catchers. The articular facets for the mandible in the Skuas, Gulls, Oyster-catchers, and Sheath-bills present their own distinctive peculiarities, but those of the Sheath-bills agree closer with those of *Hæmatopus* than with the other two groups.

It is interesting to note that the quadrate in the Skuas and Gulls is distinctly contrasted—for instance, in the posterior surface of the shaft there is in the Gulls (*Laridæ*) a foramen leading into a pneumatic interior; in the Skuas this foramen is either indicated by a simple depression or is entirely unindicated, the shaft appearing to be non-pneumatic. The shaft of the quadrate is also always relatively longer in the Gulls than it is in the Skuas, and

the orbital process is more slender and less truncated than it is in the Skuas, in which it is relatively shorter, wider, and with borders more parallel.

Vomer.—In *Chionis* the vomer is hastate in shape; in *Hæmatopus* it is much wider, and is bifurcated at its extremity, or, rather, is deeply notched.

The vomers of the Skuas and Gulls are easily contrasted, but are more like one another than they are like that of the Sheath-bill.

The *Parasphenoidal Rostrum* in the Sheath-bills presents no facets for articulation with the pterygoids (no basi-ptyergoid processes). In *Hæmatopus*, as is well known, they are present.

The *Pterygoids* in *Hæmatopus* are short and typically pluvialine. In the Sheath-bills they are distinctly peculiar, being neither typically pluvialine nor larine. They are, however, closer to the pluvialine type than the larine. The pterygoids of the Skuas are certainly larine.

Other Skeletal Features.

As regards the rest of the axial and appendicular skeleton, a few notes of a general nature seem to be worth recording as throwing light on the affinities of the Chionididæ.

Humerus.—This bone is distinctly pluvialine in its features. The sub-trochanteric and tricipital fossæ are not so distinct or specialised as in the Laridæ. Both the ridge separating these fossæ and the fossæ themselves are, however, in the Chionididæ more sharply marked and accentuated than in *Charadrius* and slightly differentiated. The humerus of the Sheath-bills comes very close to that of *Hæmatopus* and *Dromas* in this respect.

On the palmar aspect of the head of the humerus the groove for the coraco-humeral muscle is not so deep or conspicuous as in the Laridæ or Stercorariidæ, but is more sharply marked than in *Charadrius* or *Hæmatopus*. In the

Gulls and Skuas this groove is deep and **v**-shaped, and very characteristic. At the distal end of the humerus the depressions for the brachialis muscle in the Sheath-bills and Skuas are closely similar, being nothing like so deep as in the Laridæ. As regards the curvature of the shaft, the humerus of the Sheath-bills is pluvialine; that of the Skuas larine. It may be here remarked that the sub-trochanteric fossa of the Skuas is very markedly differentiated from that of the Laridæ, so that from this difference the bones of the two forms could be recognised at a glance. In the Skuas, a circular opening with smooth and well-defined margins leads into a large pneumatic recess traversed by trabeculæ, and the tricipital fossa is inconspicuous. In the Laridæ the sub-trochanteric fossa is non-pneumatic, and a sharply-defined ridge, curving inwardly, separates it from the tricipital fossa.

In this respect the humeri of the Sheath-bills, *Hemastopus*, and *Dromas* come closer to that of the Gulls than to that of the Skuas.

Phalanges.—The bony lateral expansion of the index digit is not subdivided into two fenestræ (as in the Gulls and Skuas) in either the Sheath-bills, the Oyster-catcher, the Crab-Plover, or the Stone-Curlews.

Sternum.—All that can here be said is that the general morphology of the sterna of the Sheath-bills, the Oyster-catchers, the Crab-Plover, the Skuas, and the Gulls presents its own peculiar and characteristic features. Comparisons seem quite futile. It is noticeable that in these sterna we have a series of resultant evolutionary products, which have been derived from a common ancestral type, or as the result of varying environmental or functional stresses. One peculiarity, however, may be noted about the sternum of the Sheath-bills, and that is that it entirely lacks the diagonal pectoral ridge on the inferior surface of the body of the sternum giving attachment to the outer border of the *pectoralis secundus*, which ridge, so far as I am aware, is present in all other Charadriiform types.

Coracoid.—In pluvialine types I have noticed that the

outer surface of the head of this bone is distinctly grooved ; in larine types it is flat and smooth. In this respect the Sheath-bills are pluvialine, the Skuas larine.

Pelvis.—The pelves of the Skuas and Gulls have easily recognised characters, which serve to distinguish them from other charadriiform types. For instance, the anterior iliac fossæ (on the dorsal surface of the ilia) are flattened and much less hollowed out than in pluvialine types, while the superior margins of these pre-acetabular portions of the ilia are not continued dorsally into the characteristic prominent hog's-back ridge which rides astride of the spinal processes of the sacral vertebra in the Plovers and their kindred. On the contrary, in the Skuas and Gulls this ridge has a flattened and shaved-away appearance, and this is a very characteristic feature. In these respects the pelves of the Sheath-bills and Oyster-catchers are pluvialine. They are also differentiated from the Gulls and Skuas in regard to their incurved ischiadic processes, their more massive build, and broader beam. The pelves of the Sheath-bills and Oyster-catchers nevertheless present easily-recognised peculiarities. Curiously enough, the pelves of the Skuas and Gulls seem more generalised—that is to say, less specialised away from the pluvialine type than either those of the Chionididæ or the Hæmatopodidæ. Thus in the sum of its characters or general appearance the pelvis of *Stercorarius* is very similar to that of *Charadrius pluvialis*.

The Pelvic Limb.—I have no more to say here about this than that in the Chionididæ the hypotarsus of the tarso-metatarsus is somewhat specialised and peculiar. In its features it appears to stand somewhat by itself as compared with adjacent groups. It is not larine. *Charadrius* even seems more larine in respect of this part, or, to be more correct, the Gulls are more pluvialine. It also differs from *Hæmatopus*, which again presents Gull-like propensities.

A good many writers on the Sheath-bills have referred to the resemblance that the legs and feet of these birds bear to those of the Oyster-catcher. These resemblances are more apparent than real, the bones of the pelvic limb being

distinctly differentiated in various minor details. The relative measurements are also different, as shown below :—

Length of femur	in <i>Chionis alba</i>	60 mm. ;	in <i>H. ostralegus</i>	50 mm.
„ tibio-tarsus	„	81 mm. ;	„	86 mm.
„ tarso-metatarsus	„	43 mm. ;	„	55 mm.
„ middle toe	„	38 mm. ;	„	41 mm.

Vertebral Column.—In the Sheath-bills there are only two cervico-dorsals ; in *Hæmatopus* there are three ; while the morphology of the hypapophyses of the cervical vertebra in the two forms is strongly contrasted.

Summary.

The sum of the characters presented by the skeletal, pterylographical, and other features of the Chionididæ point to the fact that this very specialised and well-defined Charadriiform group is more pluvialine than larine. It is, however, so specialised away from the “Plovers” that its inclusion in the limicoline suborder (Charadriidæ + Scolopacidae) seems a matter of doubtful propriety.

Kidder & Coues (Bull. U.S. Nat. Mus.) thought that *Chionis* was a connecting-link closing the narrow gap between the Plovers and Gulls of the present day. In their opinion the Sheath-bills represented the survivors of an ancestral type, from which both the Gulls and Plovers have descended. In this opinion I think there can be no doubt that they were mistaken, since, among other reasons, the Sheath-bill is not a generalised type but a specialised one. It is probably nearer the truth to suppose that the Sheath-bills were differentiated as an offshoot from the main charadriiform stem before that stem had split into the charadriine and scolopacine branches, and that that offshoot was given off prior to the differentiation of the Skuas and Gulls ; or, as an alternative speculation, that the main charadriiform stem split into a limicoline and a laro-limicoline branch—such groups as the Sheath-bills, Crab-Plover, Pratincoles, Skuas, Gulls, Terns, and Auks arising from the latter by various stages of specialisation.

In its osteological features the Sheath-bill presents certain resemblances to the Oyster-catcher. Nevertheless, the Oyster-catchers are not so fundamentally specialised away from the Limicolæ, and the two groups are separated by enough deep-seated and important characters as to appear to forbid their being closely associated together, the likenesses between them being presumably the result of environmental or functional stresses. Garrod, for instance (P. Z. S. 1877, p. 417), comparing *Chionis* and *Hæmatopus*, says: "Nevertheless, although these birds are both schizorhinal, their skulls give indications of a very different affinity. *Hæmatopus* possesses supra-occipital foramina, basipterygoid articulations, and a bifid vomer." Again, he goes on to add: "My dissections of both *C. alba* and *C. minor* are quite in favour of a larine affinity."

It would be idle to deny that the skulls of the Sheath-bill and the Skua do not present very striking and remarkable resemblances. Moreover, it is in just those characters in which the skull of a Skua differs from the skull of a Gull that it resembles those of a Sheath-bill. But to declare that these characters are of such importance that they point to a close affinity between the Sheath-bills and Skuas, other than that they are members of the same order (Charadriiformes) or even of the same suborder (Larolimicolæ), would be another matter; for there is the question of parallelism and plasticity due to similar superficial stresses to be eliminated. My observations seem to warrant the opinion that the Skuas are more generalised, and stand closer to the true Limicolæ (Charadriidæ + Scolopacidæ) than do the Gulls (Laridæ) or the Auks; but the more attentively one examines the osteological features proper to and peculiar to a large series of differing charadriiform groups, the more impressed one becomes with the idea that each one of such groups represents a distinct evolutionary entity, which stands by itself and which had its origin in an independent process of discontinuous variation from a common stock. It is easy to say that such a series of groups merely represent the present-day

relies of a once-existent series of continuously intergrading forms, but it is stranger to reflect how extremely difficult it is to put one's hand upon what might be termed truly intergrading links.

With a view to investigating the question as to whether, if we went far enough back in time, we should find generalised forms of Gulls and Limicolæ which would disprove such suggestions as have just been tentatively put forward, I have lately examined the collection of fossil Charadriiformes in the British Museum collection. So far as one can form an opinion from the material available, a Gull or a Tern was nothing else than a Gull or a Tern as far back at least as the Upper Oligocene (cf. *Larus* (?) *Sterna elegans* Milne-Edwards). Again, a Sandpiper was a Sandpiper and nothing else (cf. *Totanus majori* Lydekker or *Tringa gracilis* Milne-Edwards); a Spur-winged Plover was a Spur-winged Plover, and so on. On the other hand, Marsh has described *Palæotringa* from the Cretaceous Shales of Kansas, which, if really a generalised limicoline, seems to controvert such ideas. The fact, too, that the Skuas in their cranial characters seem more generalised in the direction of the Plovers gives one pause to think; but such instances do not affect the fact that, although there may be a series of *progressive steps*, it does not necessarily follow that there were links connecting such steps. But whatever the truth may be as regards the mode of origin of such charadriiform groups as the Sheath-bills and others, the outstanding fact which has impressed me is that, in so far as their osteological characters are concerned, there is very little real difference between a Gull and a Plover, and certainly very little fundamental difference that can be expressed on paper. The statement that a Gull is only a highly specialised Plover is, I fancy, regarded by most ornithologists as a mere academic expression of a somewhat hazy idea. It is, in reality, a very literal and patent fact.

Finally, I may, perhaps, be permitted to quote Shufeldt's summary of his findings in regard to the osteology of the Sheath-bill (Journ. Anat. & Phys. Lond. xxv.) :—

“To recapitulate, then, we find the skull of *Chionis minor* to be a veritable columbo-gallinaceous one, having strongly impressed upon it other characters of some such form as *Hæmatopus* with traces here and there, as we might expect, of larine structure.”

That the Sheath-bills present no such columbo-gallinaceous picture as regards their skeletal structure amounts, in my opinion, to a certainty.

VI.—Obituary.

RICHARD MANLIFFE BARRINGTON.

WE share with all Irish naturalists our great regret at the death of Mr. Barrington of Fassaroe, which took place on September 15 last very suddenly, while driving his motor-car home from Dublin.

Born at Fassaroe, near Bray, in county Wicklow, on May 22, 1849, Barrington was the eighth and youngest son of Edward Barrington. He was educated at home until he entered Trinity College, Dublin, in 1866, where he graduated with honours in 1870 as a Moderator in Experimental and Natural Science. He was called to the bar, but soon abandoned the practice of the law, preferring a more open-air life as a land-valuer, and subsequently managing his farm at Fassaroe.

An admirable example of an all-round naturalist, he will chiefly be remembered for his work on birds, and especially the migrations of Irish birds; but he also wrote extensively on mammals as well as on botanical subjects.

In 1880 he began his regular correspondence with the Irish lighthouse keepers on the migration of birds. The results of these observations were published in the form of annual reports to the British Association for 1881-7.

After 1887 Barrington continued, at great personal expense, the issue of schedules to the light-stations of Ireland for ten years longer, with the result that not merely bald and often unsatisfactory records were furnished by the light-keepers, but, in addition, over two thousand specimens,

generally wings and feet, were forwarded to him for identification. A digest of this work, which continued till 1896, was prepared by Mr. W. Eagle Clarke and published in that year.

Finally, in 1900 a large volume containing the results of all these observations was issued by Barrington under the title of 'The Migration of Birds as observed at Irish Lighthouses and Lightships' (see 'Ibis,' 1900, p. 677).

One important result of the migration enquiry was the wonderful private Fassaroe Museum, in which the rare birds received from lighthouses and the legs and wings of the commoner species were preserved. No fewer than sixteen species were by this means added to the Irish avifauna, viz.:—*Acanthis l. rostrata*, *Emberiza pusilla*, *Calcarius lapponicus*, *Alauda a. cinerascens*, *Calandrella brachydactyla*, *Otocorys alpestris*, *Lanius senator*, *Sylvia curruca*, *Melospiza u. dartfordiensis*, *Locustella certhiola*, *Acrocephalus streperus*, *A. aquaticus*, *Hypolais polyglotta*, *Phylloscopus superciliosus*, *Enanthe æ. leucorrhoa*, *Muscicapa parva*; two other species, the American *Junco hyemalis* and the Antarctic *Chionis alba* recorded by him, the latter not mentioned even in the Appendix of the new B. O. U. List, probably owe their presence in Ireland to "assisted passages."

Most of Barrington's earlier contributions to ornithological literature were published in the pages of the 'Zoologist,' his later ones in the 'Irish Naturalist' and in 'British Birds.' His first paper, on the "Food of the Wood-Pigeon," is to be found in the 'Zoologist' for 1866. He became a Member of the Union in 1881, but to the pages of the 'Ibis' he only sent a few short letters. He threw himself heartily into many enterprises for extending biological knowledge and interest in Ireland, and was one of the founders of the Dublin Naturalists' Field Club and a valued member of the council of the Royal Irish Academy, the Dublin Society, and the Zoological Society of Ireland. To his wide knowledge of natural history there was added a personal charm and a kindly humour which will always make the memory of his friendship a high privilege.

An extensive memoir, with a portrait and a complete bibliography of his scientific writings, for which we are indebted for most of the above information, will be found in the 'Irish Naturalist' for November 1915.

EWEN SOMERLED CAMERON.

We regret to record the death of E. S. Cameron, which took place at the Southern California Sanatorium, Lamanda Park, Pasadena, California, on May 25 last. His death was caused by an abscess on the brain, the result of two accidents when horses fell with him. Cameron, who was born on December 19, 1854, was the son of Allan Gordon Cameron of Barcaldene, Argyllshire. In 1885 he sold his Scottish estates and went to Montana, where he resided for many years at Marsh in Dawson County. He married in 1889 Miss Evelyn Jephson Flower, a sister of the 1st Lord Battersea, but leaves no children.

From his earliest days Cameron was devoted to ornithology, and spent all his spare time in its pursuit. He wrote "The Birds of Custer and Dawson Counties, Montana" for the 'Auk' of 1907 and 1908, and also a number of detailed studies of characteristic species of the Rocky Mountain regions, which were enhanced by the photographic illustrations contributed by his wife, who had a keen sympathetic interest in his ornithological work. To the 'Ibis' he sent only one contribution, "On the Migration of Phalaropes in Montana" (Ibis, 1900, pp. 67-70), but of late years he has written several articles on the birds of Montana for 'Country Life,' illustrated by a fine series of photographs.

He was elected a Member of the Union in 1889, and an Associate of the American Ornithologists' Union in 1903 and a Member in 1910.

OTTO HERMAN.

In consequence of the War and the difficulties of seeing foreign journals, we fear that we have overlooked the death of Dr. Otto Herman, which took place at Budapest on December 27, 1914, in the eightieth year of his age.

He was born at Breznóbánya, in Hungary, on June 27, 1835, the son of Karl Herman, a surgeon. Always interested in natural history, and especially in birds, after many youthful vicissitudes he obtained the post of taxidermist in the Museum at Siebenbürgen in 1863. Later on he became interested in politics, and was a member of the Hungarian Parliament, where he was instrumental in passing laws which greatly advanced scientific research in Hungary. In 1877 he founded the official organ of the Royal Hungarian Museum of Natural History, and was its editor for ten years. The second International Ornithological Congress at Budapest in 1891 was almost entirely under his management, and its notable success was entirely due to his power of organization and capacity for work. Herman was also the founder and organizer of the Royal Hungarian Central Bureau for Ornithology, a body primarily founded for the study of the migration of Hungarian birds, and best known, perhaps, through its organ 'Aquila,' of which twenty yearly volumes have been published.

Herman wrote extensively on other subjects, such as the ethnography, politics, folk-lore, and history of his native land. He was a man of great breadth of mind, enormous energy, and an untiring worker, and by his death Hungary loses one of its most illustrious men of science.

We are indebted to the pages of the 'Auk' for most of the facts contained in this notice.

GERALD LEGGE.

It is with great regret that we have to record the loss of another of our best field-naturalists in the Gallipoli Peninsula. Captain the Hon. Gerald Legge, 7th Batt. South Staffordshire Regiment, was killed in action at Suvla Bay on the 9th of August, 1915.

During recent years battle, murder, and sudden death have sadly thinned the ranks of the B.O.U., and prematurely claimed many of our best and bravest. Though we deplore the death of those who have accomplished their life's work and helped to make our Union famous, it is the loss of our

younger members of great promise, cut off in their prime, which must cause more infinite sorrow. To such names as Alexander, Wilson, Barrett-Hamilton, Brabourne, and Woosnam must now be added those of Captain Gerald Legge and Major C. H. T. Whitehead.

Legge was born on the 30th of April, 1882, and educated at St. David's School (Reigate), Eton, and at Christ Church (Oxford). His intense interest and delight in all matters connected with natural history was always an outstanding feature in his character, and soon after he left college he joined the famous Ruwenzori Expedition (1905-1906), his father, Lord Dartmouth, becoming one of its most generous supporters.

Woosnam, the leader of the Expedition, and Legge were at once drawn towards one another, and the meeting of these two kindred spirits led to a close friendship. It is sad to think of both dying in Gallipoli after all the travels they had done together, but such is the fortune of war. During the Ruwenzori trip Legge did admirable work, and obtained examples of quite a number of new and rare species of birds which were not met with by the other members of the Expedition, though all were experts in the work of collecting. Woosnam quickly recognised his extraordinary ability in obtaining species no one else seemed to find, and would frequently undertake the skinning of the birds, so as to leave him free to return to the collecting-ground. Legge possessed some extra sense which enabled him to detect the presence of a rare bird. In addition to this, he was an unusually fine shot, and could make wonderful practice with a .410 collecting-gun, many of his specimens, such as the new dwarf Pipit (*Anthus leggei*)—a very difficult bird to procure—being killed on the wing.

His next journey was to the Malay Peninsula, where he was interested in a rubber estate in Johore, but the climate did not suit him, and after visiting Java for a time he returned to England.

In 1909 Legge again joined Woosnam in an expedition to Lake Ngami, in South Africa, which was reached

after an adventurous journey across the Kalahari Desert (*cf.* *Ibis*, 1912, pp. 355-404). This undertaking proved highly successful, especially as regards the collection of the fishes—which were greatly wanted by the British Museum—from that rapidly disappearing lake. Among the swarms of water-fowl which frequented the extensive reed-beds surrounding Ngami, Legge had ample opportunity of adding examples of several species to his favourite group of birds. The Duck-tribe was his special hobby, and the acquisition of several specimens of the Cape Shoveler, a rare bird in most collections, was especially welcome to him. His Duck collection contained many interesting examples of species in the eclipse-plumage which he had taken special pains to procure.

During the last few years, as County Commissioner for Staffordshire, he had done much good work among the Boy Scouts, and at the commencement of the War he joined the 7th Batt. South Staffordshire Regiment, and went with them to the Dardanelles. Though twice wounded in the shoulder and the thigh on "Hill 70" on the 9th of August, he refused to allow anyone to leave the firing-line and carry him out of danger, and, while mortally wounded, kept shouting encouraging words to his men. They were all devoted to him. A Sergeant of "D" Company writes:—"There are none left who knew him who will ever forget him. He was my ideal type of an English officer and a gentleman . . . he didn't know what fear was."

Gerald Legge was a delightful fellow, full of fun and quiet humour, a great sportsman, and an ideal companion. He died as he had always lived, thinking of others. His many friends are very proud of him, but that does not make the loss easier to bear.

W. R. O.-G.

SIR ARTHUR WILLIAM RÜCKER.

The death of Sir Arthur Rücker, F.R.S., formerly Principal of the University of London and from 1896 to 1901 one of the Secretaries of the Royal Society, took

place at Everington, near Newbury, Berks, on the 1st of November last.

The eldest son of Mr. Daniel H. Rücker, a City merchant residing at Clapham, he was born there in 1848. The family is of German origin. He was educated at Clapham Grammar School and at Brasenose College, Oxford, of which he was subsequently elected a Fellow after taking a first in both the Mathematical and Natural Science Schools.

After holding various teaching posts, Rücker was appointed in 1886 Professor of Physics at the Royal College of Science, which he only relinquished in 1901 when he became Principal of the University of London. Under his guidance the University was transformed from a mere examining body to a real teaching University.

His most important work, done in conjunction with Professor Thorpe, was a magnetic survey of the British Islands. It occupied them over fourteen years.

Sir Arthur Rücker was much interested in ornithology, and was elected a Member of the B. O. U. in 1910. He was elected a Fellow of the Royal Society in 1889, and received their Royal Medal in 1891. He was President of the British Association in 1901.

CHARLES HUGH TEMPEST WHITEHEAD.

It is with great regret that we have to chronicle the loss of another of our younger and more energetic Members, who was killed in action on the 26th of September last in France.

Major Whitehead was the seventh son of the late Mr. George Whitehead and Mrs. Whitehead, of Deighton Grove, Yorkshire, and entered the Army in 1901. He served in the 56th Punjabi Rifles, of which he was Adjutant in 1909. He was promoted temporary Major in 1914. He had already fought in the Boer War, receiving the Queen's medal and three clasps. At the time of his death he was attached to the Highland Light Infantry, his old regiment, and it was when leading a company of that regiment in

the attack that he fell, mortally wounded, on the very parapet of the trench which was being stormed.

Whitehead's loss is one which will be felt, not only by his personal friends, which included all who knew him, but also by the ornithological world, for he was one of the most accurate and painstaking of field-naturalists, and he was already making his mark in Indian ornithology.

His work on the north-west frontier of India resulted in the extension of the known habitat of many birds, and amongst the most striking of his discoveries was undoubtedly that of the breeding-haunts of that little-known bird *Acrocephalus agricola concinens*, the Chinese race of the Paddy-field Warbler of India. He also discovered, together with its nest and eggs, a new Thrush, *Oreocincla whiteheadi* Baker, at an elevation of some 12,000 feet, in the Khagan valley.

To the 'Ibis' Whitehead contributed two important papers, one on the birds observed by him on the Orange River in South Africa in 1901-2, when stationed on the line of block-houses running along that river between Aliwal North and Norval's Pont during the later part of the Boer War (Ibis, 1903, pp. 222-238). A second paper was that on the birds of Kohat and Kurram, on the borders of Afghanistan, prepared with the assistance of Major H. A. F. Magrath; in this little-known region, at the junction of the Palearctic and Indian regions, he discovered the very interesting hybrid Bulbuls (*Molpastes intermedius* $\times$ *M. leucogenys*): this was also published in the 'Ibis' (1909, pp. 90-134, 214-284, 620-623). Many shorter articles and notices were sent to the 'Journal' of the Bombay Natural History Society and to the 'Bulletin' of the B. O. C.

In person Whitehead was singularly charming, very earnest and thorough in all he undertook. At the same time he had a somewhat reserved manner, and his great modesty prevented him from publishing much of the interesting work he accomplished in the little-known region in which he spent so many years. He was elected a Member of the Union in 1903, and was only 34 years of age when he fell.

HENRY EELES DRESSER.

As we go to press we hear with deep regret of the death of Mr. Dresser on November 28 last, at Cannes. We hope to publish a memoir of him in the next number of 'The Ibis.'

VII.—*Notices of recent Ornithological Publications.**Blaauw's Travels in South Africa.*

[Ornithologische waarnemingen in het zuiden der Kaapkolonie door F. E. Blaauw. 'Ardea,' Leiden, 1915, pp. 1-19, 49-74, pls. ii. & iii.]

In March last year our fellow-member, Mr. Blaauw, made a journey to South Africa, and in this paper he tells us his adventures and a good deal about the birds he noticed at the different places he visited.

Landing at Cape Town on the 1st of April, he noticed the European Swallows just getting ready to depart northwards, and mentions many of the commoner birds, Doves and Robins (*Cossypha*), Fiskal Shrikes, and Sparrows. The abundance of the European Starling, only introduced a few years ago, greatly astonished him. Leaving Cape Town by train he travelled *via* Caledon to Bredasdorp, a village in the south-western part of the Colony, near which is Dr. Albertyn's farm of Nachtwacht, where the handsome antelope, the Bontebok, still survives, and where it has been carefully preserved for 100 years; thence travelling back to Caledon and on to Oudtshoorn, where he visited the celebrated Cango caves, and Mossel Bay, he took ship to Port Elizabeth, East London, and Durban, at all of which places he made excursions and noted the occurrence of the various birds he met with.

He mentions what does not seem to have been noticed before, the common occurrence of the Indian Mynah (*Acridotheres tristis*) at Durban, where it has been introduced by the Indian coolies. He also mentions one particularly rare bird, *Chætops frænatus*, which he came across near Caledon.

Leaving Durban on May 15, he got back to Antwerp about a month later. The two plates are from photographs: one of the interior of the Cango caves, the other of the breeding-place of the Malagash (*Sula capensis*), probably on Bird Island in Algoa Bay.

Chalmers Mitchell on the Anatomy of the Coulan, or Limpinkin.

[Anatomical Notes on the Gruiform Birds *Aramus giganteus* Bonap. and *Rhinocetus kagu*. By P. Chalmers Mitchell. Proc. Zool. Soc. 1915, pp. 413-423.]

The opportunity of the death of the only example of this species which had ever reached the Zoological Gardens enabled Dr. Mitchell to make a dissection of this rare bird, which is a northern representative of *Aramus scolopaceus* of South America.

The anatomy of the South American species had already been studied by Garrod and by Dr. Mitchell himself, and, as was to be expected, it was found that the northern form resembled the southern one very closely so far as anatomical characters were concerned. Dr. Mitchell wisely warns us as follows:—"I do not suggest, however, that the two species should be merged. The more experience I gain of avian anatomy, the more I am convinced that systematists are well advised when they rely, at least with regard to the discrimination of species and genera, more on those superficial characters that they can observe in the series of museum collections, than on the uncertain indications afforded by the presence or absence of this or that muscle."

A full discussion of the myology is given, and the final conclusion is stated that *Aramus* is naturally and properly placed among the Gruiform birds.

Chapin on new African Birds.

[Descriptions of three new Birds from the Belgian Congo. By James P. Chapin. Bull. Amer. Mus. N. H. New York, xxxiv. 1915, pp. 509-513.]

During the last six years the American Museum has had an exploring and collecting expedition in the Belgian Congo,

under the leadership of Mr. Herbert Lang. The collections, which have been gathered from all parts of that vast territory from Lado to Boma, have now reached New York. The bird-skins are about 6000 in number, representing some 600 species, and many of these appear to be hitherto unknown. The first three new forms are here described, viz. *Chætura melanopygia*, *Apaloderma minus*, and *Cerioleptes xenuus*, all from the Ituri district. The last named, for which a new generic name is proposed, is a new type of Honey-Guide (Indicatoriæ), distinguished by its curiously-shaped tail composed of twelve pointed and outwardly-curved feathers, the middle pair being the longest and widest and forming a strong fork, the others narrow, stiffened, and successively shorter. The under tail-coverts are unusually long and project into the fork of the tail. A figure of this remarkable structure is given.

Cooke on the Protection of the American Shore-birds.

[Our Shore-birds and their Future. By Wells W. Cooke. Year-book Dept. Agric. Washington, D.C. for 1914-1915, pp. 275-294.]

More and more our American cousins are getting anxious about the preservation of bird-life in the United States, and every year sees additional legislation, the extension of reserves, and the restriction of indiscriminate shooting, and, what is more important still, a healthier public sentiment about this matter. The present pamphlet by Mr. Cooke, who is perhaps our best authority on migration and migration routes in the States, pleads for the Wilson Snipe, the American Woodcock, and the Upland Plover, all of which, but especially the Woodcock, which breeds throughout the eastern half of the States, have become much diminished in numbers. Up till quite recently it has only been possible to make protective laws by State legislation, but it has become increasingly evident that Federal legislation covering the whole of the United States is necessary, and after many years of agitation, a national law for protecting migratory game and insectivorous birds was passed by Congress in 1913. Under its provisions the Department of Agriculture is given

full authority to determine what shall be closed seasons, and to prepare regulations for their due observation. This has now been done, and spring-shooting, when birds are returning from their winter-quarters to their breeding-places, has now been forbidden. It is hoped that this, together with an enlightened public sentiment to aid in its enforcement, will allow the Shore-birds, as well as the Woodcock and Snipe, to again become common enough, not only to enliven the beaches and swamps with their welcome presence, but to afford the hunter a fair amount of legitimate sport.

Cory on new South American Birds.

[Notes on South American Birds, with descriptions of new Subspecies. By Charles B. Cory. Field Mus. Nat. Hist. Chicago, Ornith. Ser. i. 1915, pp. 303-335.]

The first portion of this paper contains descriptions of new subspecies of *Threnites*, *Piaya*, *Chrysoptilus*, *Veniliornis*, and *Scapanus*, from different localities in South America, together with keys of the subspecies of *Chrysoptilus punctigula*, and of the species of *Piaya*.

The latter portion of the paper is devoted to a discussion of the various forms of the American Sparrow-Hawk (*Cerchneis sparveria*) found in South America. Mr. Cory recognises fourteen subspecies, three of which he here describes for the first time.

Faxon on Peale's Museum.

[Relics of Peale's Museum. By Walter Faxon. Bull. Mus. Comp. Zool. Harvard, lix. 1915, pp. 119-148.]

It has always been a matter of regret to American ornithologists that the birds known to have been deposited in the Museum known as Peale's Museum at Philadelphia have been lost to science.

Charles Willson Peale, artist and soldier, born in 1741, started his Museum in 1784 in Philadelphia; after his death it became the property of a joint stock company, which finally came to grief, and the natural history specimens were acquired half by P. T. Barnum and half by Moses Kimball.

Peale's Museum was of considerable scientific importance ; in it were deposited the spoils of the Lewis and Clark Expedition to the Columbia River in 1804-1806, as well as those obtained by Major Long, with his assistants Thomas Say and Titian R. Peale (son of Charles Willson Peale) during his journey to the Rocky Mountains in 1819-20. Wilson, the author of 'American Ornithology,' and many of the other early American naturalists also deposited their collections in Peale's Museum, so that a number of invaluable types of North American birds must have been stored there. The portion of the collection bought by Moses Kimball in 1839, who was the proprietor of a Museum in Boston known as the New England Museum, has now, after many vicissitudes, passed into the possession of the Museum of Comparative Zoology at Cambridge, Mass.

Mr. Faxon has now been very carefully through all these old and somewhat battered birds, and has endeavoured to trace a connection between them and the birds as figured by Wilson, some with more, some with less success. As all the old labels were removed at the time of the sale of Peale's Museum, these identifications must always be a matter of some doubt, but it seems probable that some, at any rate, are correct.

Ghidini on the Herring-Gull.

[*Le Larus cachinnans* Pall., à Genève. Par Angelo Ghidini. Bull. Soc. Zool. Genève, 1915, pp. 111-115.]

All the evidence collected by Mr. Ghidini goes to prove that the Herring-Gull of the Lake of Geneva, where, however, it is not very common, is the Mediterranean form *L. cachinnans*, and not *L. argentatus* as has been generally supposed. He has not been able as yet to find out to which race the Herring-Gulls frequenting the Lake of Constance belong.

Gordon on Hill Birds of Scotland.

[Hill Birds of Scotland. By Seton Gordon, F.Z.S., M.B.O.U. Pp. xii+300; many illustr. London (Arnold), 1915. 8vo.]

This volume contains field-notes and observations by the

author, together with a good deal of other matter mostly derived from unrevealed sources relating to the following species:—Golden Eagle, White-tailed Eagle, Osprey, Peregrine, Kestrel, Raven, Grey Crow, Ptarmigan, Black Grouse, Red Grouse, Capercaillie, Woodcock, Snipe, Goosander, Curlew, Greenshank, Golden Plover, Dotterel, Oyster-catcher, Snow-Bunting, Dipper, Crested Titmouse, Sandpiper, and Dunlin, in the order given. Not a very scientific arrangement, and it is difficult to see why some of these should have been included among the “Hill Birds” to the exclusion of others. A few good photographs are reproduced illustrating some of the birds, their nests, and the surrounding scenery.

There is nothing told about these “Hill Birds” which is new or of special interest, and the author would have been wiser had he omitted discussions on subjects of which he has evidently no real knowledge and had confined himself to his personal observations. Some of these will no doubt be found interesting enough to the general reader, but unfortunately he has interlarded his chapters with many travellers’ tales gathered from the hearsay of stalkers and such-like sources, which should be accepted with caution. Take the Golden Eagle as an instance. It is not clear whether such stories as the encounter between a Fox and a Golden Eagle (p. 12) are the result of personal observation. Many of his statements are obviously incorrect. It is solemnly suggested that the presence or absence of markings on the eggs of the Golden Eagle may possibly denote the sex of the young bird, though the author is not sure whether the spotted egg contains a male or a female. “Deer, calves, and lambs are taken also, though I cannot say I have ever come across the remains of *either* of these animals in an eyrie.” Lambs we have seen, and once a black water-vole, besides the usual grouse and blue hares at the nest, but never deer and calves! The remains of “three hundred duck and forty hares at one nest” sounds rather a tall order.

We are also told “there is no bird has so wide a range as

the Golden Eagle—in fact it is met with throughout the world.”

This is the sort of loose statement that discredits the whole book—the little knowledge the publication of which is not only misleading but does much harm.

It would be interesting to learn what authority there is for stating that a Grouse from the south of Ireland “turned the scales at no less than two and a half pounds.” The record, so far as we are aware, is one of 34 ozs.; but 40 ozs. ! (p. 146). It must have been a muckle Grouse.

The author’s remarks on the supposed occurrence of the Rock-Ptarmigan, *Lagopus rupestris*, in Sutherland are amusing (p. 127). It would be interesting to know how he distinguishes between females of *L. mutus* and *L. rupestris* in breeding plumage. Apparently he can do so quite easily. We are told that the “true Ptarmigan” occurs in the Altai Range, etc., and in Japan, though it is well-known that only the Rock-Ptarmigan is found there: also that “it seems to be absent from the Himalayas and the Andes.”

The author evidently considers that, in the interests of photography, it is lawful to hustle a Goosander off her eggs, causing her to break one and no doubt forsake them, or to bundle a half-fledged family of young Crested Titmice out of their nest; but he regards it as a sin that a few specimens of the latter species (we find on enquiry at the British Museum there were only five) should have been collected with the landowner’s permission for the National Collection for strictly scientific purposes.

Of the Woodcock he writes:—“When the blackberries have ripened, the Woodcock betake themselves to the hill-sides and consume great quantities of the fruit” (p. 160).

No proof of this amazing statement is offered. When is a Woodcock not a Woodcock? When it’s a Blackcock or Grouse.

Surely no good Scotchman wants to talk of “Scots” firs!

These are only a few instances of the book’s imperfections.

Hony on Wiltshire Birds.

[Notes on the Birds of Wiltshire. By G. Bathurst Hony, M.B.O.U. Wilts Archæol. & Nat. Hist. Mag., Devizes, xxxix. 1915, pp. 1-14.]

Since the appearance of the Rev. A. C. Smith's 'Birds of Wiltshire' in 1887, many new records for the county have occurred. At the same time Mr. Smith erred perhaps on the lenient side in admitting a good number of species to his list on what seems to be insufficient or incomplete evidence. In the present paper Mr. Hony rejects the Great Black Woodpecker, the Yellowshank, and one or two other species from his list and adds several new ones, giving a summary of the evidence relating to the occurrence of many of the newer visitors.

A complete list of the birds known to have occurred in Wiltshire is given by Mr. Hony. These number 248, but nine of these are unsatisfactory in Mr. Hony's opinion, the correct number is therefore 239. In Smith's work, which included the nine unsatisfactory records, 235 were given, so that thirteen species have been added to the list since 1887.

Levick on the Adélie Penguin.

[Natural History of the Adélie Penguin. By Staff-Surgeon G. Murray Levick, R.N., in the Natural History Report of the British Antarctic ('Terra Nova') Expedition, 1910: Zoology, vol. i. no. 2, pp. 55-84, pls. i.-xxxi. London (British Museum Natural History), 1915. 4to.]

The literature on the subject of the Adélie Penguin is now becoming very extensive. Not only have Dr. Wilson, Mr. Bernacchi, and Dr. Louis Gain, the zoologist of Dr. Charcot's expedition, given us a good deal of information, but Dr. Levick himself has already published an account of his observations in popular form under the title of 'Antarctic Penguins: a Study of their Social Habits.' We welcome the present account, however, as the size of the publication enables justice to be done to the magnificent photographs, 31 in number, taken by the author himself: they illustrate all the phases of the Penguin's life, and give one a wonderful idea of its life when at the rookery.

Staff-Surgeon Levick's observations were all made at the rookery at Cape Adare during the summer season 1911-12, and he enters very minutely into the life-history of the birds during mating, nesting, incubation, and the upbringing of the young birds until the departure from the rookery, for which, curiously enough, he does not give a definite date.

Mathews on Australian Birds.

[The Birds of Australia. By Gregory M. Mathews. Vol. v. pt. 1, pp. 1-152, pls. 234-244. London (Witherby), November 1915. 4to.]

In this Part the author has reached the Falconiformes, and he begins the Order with his usual preliminary dissertation, in which he treats of its handling by Kaup, Sharpe, Gurney, and others. Naturally we cannot always expect such discoveries as in the case, for instance, of the Petrels; but the interest is well sustained throughout these pages, and lies to a great extent in reviewing the work of ancient voyagers, while determining the species they met with, and correcting their errors or those of their successors. Very full accounts are given of the early history of the birds, and of the genera under which they should be placed; while much information, both old and new, is given of their habits, the Harriers and the Wedge-tailed Eagle being good examples of this treatment.

On one point we can hardly agree with Mr. Mathews. He appears to consider it best that all doubtful forms should be provisionally named, and the names upheld until their validity is disproved. This tends to cumber our pages subsequently with many synonyms, and we believe that the needs of the moment might be met by simply discussing the forms without naming them, especially in the case of subspecies. In the present Part, racial names are bestowed on various subspecies, though they are included in the specific synonymy, and are only recognized as doubtful in the letterpress that follows (*cf.* pp. 32, 42, 71, 81, 112, 123, 142, 148).

Several points of special importance should be noticed. Lacepède's names are considered "*nomina nuda*" and cited

as of Daudin. The species of *Circus* and *Leucospiza* are carefully disentangled, the Grey and the White Goshawk being referred to the latter genus, and considered distinct species rather than colour variations, though they sometimes interbreed. Similarly many difficulties are cleared up with regard to *Astur approximans*, now shown to be correctly named *Urospiza fasciata*. A new subgenus, *Paraspizias*, is proposed for *Accipiter cirrhocephalus*. *Hieraëtus* is used as the generic name for *Nisaëtus morphnoides*, which is considered to be merely a subspecies of the Palearctic *H. pennatus*, and *Cuncuma* is used for *Haliaëtus leucogaster*. *Butastur teesa* is given as doubtfully Australian. *Ictiniastur* is proposed as a new subgenus for *Milvus sphenurus* of Vieillot.

The new subspecies in this Part are *Circus assimilis quirindus* from Celebes, &c., and *Accipiter cirrhocephalus quæsitandus* from northern Australia, while *Leucospiza nove-hollandiæ alboides* is suppressed.

Many of the Watling drawings come to be considered in this portion of the work.

Miller on new Generic Types.

[Three new Genera of Birds. By W. De Witt Miller. Bull. Amer. Mus. N. H. New York, xxxiv. 1915, pp. 515-520.]

The new genus *Stringonax* is proposed for *Bubo blakistoni* Seeborn as a type, and for its ally *B. doerriesi*, from Japan and from eastern Siberia respectively. Mr. Miller points out that these Owls are really most nearly related to the Fish Owls, *Ketupa*, but quite distinct from these as well as from *Bubo*.

For the Neotropical Goatsuckers *Hydropsalis lyra* (Bp.) and *H. segmentata* (Cass.), the new genus *Uropsalis* is proposed, the first-named species being the type. In the graduation of the tail and the form of the wing these species are markedly distinct from *H. creagra*, the type and only other species of the genus *Hydropsalis*. A third genus, *Chryserpes*, is proposed for the peculiar Haitian Woodpecker, *Chloronerpes striatus* (Müll.) of Sharpe's 'Hand-list.'

Shufeldt on the Eggs of the Auklets.

[Eggs of North American Water-Birds, Parts ii. & iii. By R. W. Shufeldt. 'Blue-Bird,' Cincinnati, vii. 1915, pp. 270-278, 300, 304, pls. v.-ix.]

This is a short notice of the Alcidae of the United States, with descriptions and figures of their eggs. Some of these are reproduced in colour.

Taverner on the shortcomings of Canadian Ornithologists.

[Suggestions for Ornithological Work in Canada. By P. A. Taverner. Ottawa Naturalist, xxix. 1915, pp. 14-18, 21-28.]

The study of Canadian birds has hitherto, according to Mr. Taverner, been much neglected, and what work has been done has been accomplished to a great extent by the naturalists of the United States. To improve this state of things a number of lines of investigation are suggested, especially in regard to migration problems, as well as in the more accurate determination of the distribution of bird-life in the Dominion. To these and other matters Mr. Taverner calls the attention of his fellow ornithologists in Canada.

Thorburn's British Birds.

[British Birds, written and illustrated by A. Thorburn, F.Z.S. Vol. ii. pp. vi + 72, pls. 21-40. London (Longmans), 1915. 4to. £6 6s. for the 4 vols.]

The second volume of Mr. Thorburn's beautiful work follows quickly on the first, which was noticed in the July number of the 'Ibis' last year.

The Passerine birds are completed with the Larks and Crows, and in addition the Picarians, Birds of Prey, Cormorants, and Herons are dealt with in the present volume.

As most of the species figured in this volume are large ones, they are not so crowded as in the first, only two or three figures, as a rule, occupying each plate. This, to our mind, constitutes a great improvement. We would especially commend Plate 28, the Eagle Owl, and Plate 36, the

Greenland and Iceland Falcons, as magnificent reproductions of the birds, and very fine pictures; while Plate 24, which contains the Woodpeckers, the Kingfisher and Roller, appears to us somewhat incongruous, and justice is hardly done to the brilliant coloration of the two last-named species, nor do they seem happily placed in the same surroundings as the Woodpeckers; but this is, of course, inevitable with the plan of the work.

We shall look forward to the appearance of the next volume, which we presume will contain the Game-birds and Ducks, in the representation of which Mr. Thorburn is so justly famed.

Wood on the Eyelids of Birds.

[The Eyelids and Lachrymal Apparatus of Birds. By Casey A. Wood, M.D. Reprint from 'Ophthalmology,' Seattle, U.S.A., for July 1915, pp. 1-18, 11 figs.]

Those interested in the muscular and nervous mechanism of the birds' eyelids and lachrymal apparatus, together with their structural details, or who are curious about the arrangement by which the anterior surface of the eyeball in birds is cleansed or protected from various forms of injury, will find much instructive material in Dr. Casey Wood's exhaustive paper on the subject above quoted.

Most of the investigations forming the basis of this paper were made in the physiological laboratories of Stanford University in conjunction more especially with Professor Slonaker, and the results were first reported to the Ophthalmological Congress at Oxford in July 1914.

It is probable that among the many interesting details which Dr. Wood records, what will interest ornithologists more especially is the fact that, unlike what obtains in Man and many other Mammals, there is no true union of the conjunctivæ of the two lids in birds prior to hatching. "In the Sparrow," says Dr. Wood, "and probably in all the Passeriformes, the lids are wide open during embryonic life; but as soon as the embryo is hatched the eyes are closed and remain

closed for several days. There is no evidence that any organic union occurs between the lid-margins in these 'born-blind' birds. In all probability the closed eyes are due to tonic contraction of the orbicularis muscle as a light-reflex act."

It follows that, if this is so, we have no means of foretelling by an examination of the eyelids of the embryo, whether or no such an embryo will be hatched "blind." It is probably true to say that most ornithologists would have thought otherwise.

Details are given of the structure and functions of the nictitating membrane.

Slonaker and Wood conclude that this membrane is a conjunctival duplication—a thin translucent membrane composed of delicate connective tissue interspersed with elastic fibres running in various directions. It has a firm thickened free margin, but no hyaline cartilage cells. This latter provision enables the free border to be closely applied to the cornea, so that when it sweeps over the latter it carries with it some of the fluid secretion of the Harderian gland and thoroughly cleans and moistens the corneal surface. The presence of elastic fibres gives to the third lid the qualities of a thin rubber band which, when put upon the stretch, instantly flies back the moment the traction or "pull" is released.

In connection with this nictitating membrane, the important and interesting structure known as Slonaker's *marginal plait* is described and illustrated, and the author calls attention to the fact that strangely enough Fumagalli ("Ueber die feinere Anatomie des dritten Augenlides," Internat. Monatsschr. für Anatomie und Physiologie, vol. xvi. 1899, p. 129) seems to have entirely overlooked it.

Interesting details are given as to the mode of attachment of the Pyramidalis muscle to the free border of the third lid and its mode of action.

The musculature of the eyeball and the structure of the lachrymal gland and its ducts are described at length.

The Auk.

[The Auk. A quarterly journal of Ornithology. Cambridge, Mass., U.S.A. Vol. xxxii. 1915.]

The volume of the *Auk* for 1915 contains a large number of articles on various aspects of Ornithology, and it is impossible to do more here than indicate the contents of some of the more attractive ones.

We may preface our remarks by stating that a new drawing of the Great Auk has been prepared by Mr. Fuertes and appears on the brown cover of the January number for the first time. It is decidedly an improvement on the former design in every way.

Among the anatomical papers is one by Dr. H. von Ihering, of the São Paulo Museum in Brazil, in which he combats the proposed separation of the Furnariidæ as a distinct family from the Dendrocolaptidæ. This proposal, advocated by Ridgway and other authors, is based mainly on the supposed schizorhinal characters of the skull of the Furnariidæ as opposed to the holorhinal skull of the Dendrocolaptidæ. Dr. von Ihering shows that, as Fürbringer has already made clear, the so-called schizorhinal modification in the Furnariidæ is only superficial and of no morphological value, and that there are no anatomical grounds for separating these two groups into distinct families.

Dr. Shufeldt's memoir on the anatomy of the last Passenger Pigeon has already been noticed in our pages. He also describes a new species of *Hesperornis* (*H. montana*) from Cretaceous beds in Montana, and some further account of an extinct Cormorant (*Phalacrocorax macropus* Cope) from the tertiary beds of the same State.

In an interesting communication Mr. O. Bangs discusses the question of the dichromatic phases of certain Herons, especially *Butorides brunnescens* of Cuba and its relation to the widely-spread *B. virescens*. Apparently every variation, from the extreme erythristic phase to individuals hardly separable from the common *B. virescens*, occur, while the

two forms are found in the same distributional area, and Mr. Bangs considers *B. brunnescens* can only be regarded as a colour variation. The same conclusions hold good in the case of *Ixobrychus neoxenus* (Cory), which is only a colour phase of *I. exilis*, and *Ardea herodias wardi* Ridgw. and *A. würdemanni* Baird, which bear the same relation to *A. herodias occidentalis* Aud.

Among the North American faunal papers, which are generally illustrated with photographs of the scenery of the localities, are those of H. H. Kopman on the birds of Louisiana; Geo. Willett on those of Forrester Island, Alaska; G. F. Simmons on the birds of Houston in Texas; and S. F. Rathburn on those of Puget Sound on the Pacific Coast.

Of faunal papers outside North America, Mr. J. C. Phillips writes an account of a desert journey made by him in the spring of 1914 from Suez through the Sinaitic Peninsula to Jerusalem. He was fortunate enough to obtain an example of the very rare *Strie butleri*, of which only two examples had been previously taken. This species is figured in colour. He also distinguishes as new a Rose-Finch from Petra in southern Palestine, under the name *Carpodacus synoicus petræ*.

Mr. R. C. Murphy, who recently went on a whaling voyage to the southern seas, contributes three short papers. A few hours spent on the island of Fernando Noronha, off the coast of Brazil, did not produce anything novel. In a second paper he extends the range of *Oceanodroma leucorhoa* southwards into the tropical Atlantic, off Cape São Roque, in Brazil.

A discussion of the history and avifauna of Trinidad Island in the south Atlantic forms the subject of a third paper by Mr. Murphy. He was unable to land on the island, but spent a day fishing from a small boat outside the line of the breakers, and secured a Petrel which he believes to be new, and calls *Æstelata chionophara*; this is the fourth species of the genus described from this island, the others being *Æ. arminjoniana*, *Æ. trinitatis*, and *Æ. wilsoni*, all closely allied in structure and only differing

in plumage details. The explanation and significance of this phenomenon is still to be sought.

Among strictly systematic papers continued in the present volume is one by Mr. F. M. Chapman on the genus *Scytalopus* of the Neotropical family Pteroptochidae. These birds are exceedingly shy and retiring, of mouse-like habits, and live in the dense undergrowth of the Andean Forest. They are consequently exceedingly rare in collections. Mr. Chapman reviews the species found in the northern parts of South America and proposes four new species—*S. canus*, *S. infasciatus*, *S. sanctæ-martæ*, and *S. paramensis*, and a new generic name *Myornis* for *S. senilis* (Lafr.).

In a study of the migration routes by which birds reach the Mackenzie Valley of north-west Canada, Mr. W. W. Cooke finds that the larger proportion of the summer birds of this region come from the Mississippi Valley, and comparatively few from California and the country west of the Rocky Mountains. He has been able to construct what he calls isochronal lines, showing on the map the latitudes reached on any particular date in the northward movements of a species; if these are correctly plotted they show very clearly the route of the migration of a species.

A series of five articles on the early history and distribution of the Wild Turkey in North America, commenced in the previous volume by Mr. A. H. Wright, are now brought to a close.

There are many other papers which we should like to notice, but space forbids. We would like to draw attention, however, to an appreciative memoir of Theodore N. Gill (1837-1914), whose death was not noticed in the pages of 'The Ibis.' Though chiefly known as an ichthyologist, he wrote largely on other subjects and at one time owned and edited an ornithological journal, 'The Osprey.' He was described by Dr. Jordan as "Master of Taxonomy," while Prof. Baird characterised him as "the most learned of American naturalists."

Avicultural Magazine.

[Avicultural Magazine. Third series. Vol. vi., Nov. 1914–Oct. 1915.]

So many of our members are also members of the Avicultural Society that it is hardly necessary to do more than to call attention to the continued excellence and interest of the magazine.

The present volume contains coloured plates of the Brown Thrasher (*Harporhynchus rufus*) and the Rose-breasted Grosbeak (*Hedymeles ludovicianus*), both by Bruce Horsfall, an American artist, and also of *Pyrrhula erythrocephala*, of the Mikado Pheasant, and the Ruddy-headed Goose.

Descriptions of the breeding-habits in captivity of the following species are recorded:—*Charmosynopsis pulchella* by E. J. Brook; *Geocichla citrina*, *Turdus migratorius*, and *Urocissa occipitalis* by Dr. M. Amsler; *Liothrix luteus* by G. E. Low; *Conurus cactorum*, *Panurus biarmicus*, and *Zosterops viridis* by Dr. Lovell Keays; *Colius striatus* by G. H. Gurney; and *Glaucidium jardinei* by Miss Chawner. In the case of the two last-named the medal of the Society was awarded.

One of the recent triumphs of aviculture is the successful introduction and keeping of Humming-birds in Europe. An anonymous French correspondent gives some account of his journey to the West Indies in search of these birds. He was able to bring back with him alive three species—*Eulampis jugularis*, *E. holosericeus*, and *Bellone exilis*. One bird of the first-named species and an example of the Cuban *Sporadinus recordi* have been in the possession of Mr. D. Ezra for now over a year, and appear to flourish in a room in Mount Street, Grosvenor Square!

Dr. Hopkinson continues through the volume his Dictionary of the English names of Farrots; and Mr. Astley, the genial editor, to whom we must offer our congratulations on completing another volume, communicates a most interesting observation of an incident in the life-history of the Cuckoo.

California Fish and Game.

[California Fish and Game. Conservation of Wild Life through Education. Vol. i. nos. 1-4, 1914-1915.]

This is a new magazine issued quarterly by the California Fish and Game Commission, in order to endeavour to educate the Californians, before it is too late, in the matter of the conservation of wild life. Many of the articles deal with the game animals and the fishes, but there are many notices of the increasing rarity of some of the Californian birds, especially the Pigeons and Ducks. Messrs. Grinnell and Bryant enter a special plea for the Wood Duck (*Aix sponsa*), with the exception perhaps of the Chinese Mandarin, the most brilliantly coloured of all the Ducks. Formerly it was abundant throughout California, where it is practically a resident, only making a slight north and south migratory movement each year. Now it can hardly be included among Californian Game-birds, it has become so scarce. Under the new Federal game-law it has been afforded complete protection for five years, and it is hoped that this may enable it to increase its numbers throughout the State.

Messenger Ornithologique.

[Messenger Ornithologique. Cinquième année, 1914, Nos. 1 & 2.]

Only the first two numbers of this Russian ornithological periodical reached us last year. Probably the other two were lost in the post at the beginning of the war; but as few copies of this journal reach England, it seems worth while, at any rate, to give the principal contents of these two numbers.

The volume opens with an account of a collection of birds made in the Caucasus in the summer of 1913 by Prof. Suschkin. It is written, as are all the contents of the journal, in Russian, but has a German resumé. Other articles by the same author deal with the racial forms of *Caccabis chukar*, with the possible occurrence of *Cyanistes cyanus yenisseeensis* in the neighbourhood of Kiev, with the Cuckoos of Turkestan,

whence he distinguishes a new subspecies *Cuculus canorus subtelephonus*, which is stated to breed there, and finally with the taxonomy of the forms of *Parus bokharensis* found in the same region.

M. Serebrowsky writes on the birds of the Government Nischegorodsk, and M. P. L. Ammon on finding *Troglodytes parvulus* and *Aquila chrysaetus* breeding in the Government Tula. Finally, the Editor, M. G. I. Poliakov, concludes his account of the ornithological explorations which he made in 1909 to the Saissan-nor and Markakul lakes in western Siberia. This last-named article is separately paged and illustrated with a number of photographs and drawings, and will, we presume, be eventually issued as a separate work.

List of other Ornithological Publications received.

- BONHOTE, J. L. Vigour and Heredity. London, 1915.
 GRINNELL, J. A Distributional List of the Birds of California. Pac. Coast Avifauna, No. 11. Hollywood, Cal., 1915.
 PONCY, R. Rapport de la Station Ornithologique du Port de Genève et de ses Environs, 1914-5.
 Contribution à l'Etude de la Faune du Grand-Saint-Bernard. Bull. Soc. Zool. Genève, ii. 1915.
 SHUFELDT, R. W. A Critical Study of the Fossil Bird *Gallinuloides wyomingensis* Eastman. Journ. Geol. xxiii. 1915.
 Comparative Osteology of Certain Rails and Cranes, etc. Anat. Rec. ix. 1915.
 Austral Avian Record. (Vol. iii. No. 2. London, 1915.)
 Avicultural Magazine. (Third Series, Vol. vii. Nos. 1, 2. London, 1915.)
 Bird Notes. (New Series, Vol. vi. Nos. 10-12. Ashbourne, 1915.)
 British Birds. (Vol. ix. Nos. 6, 7. London, 1915.)
 The Condor. (Vol. xvii. Nos. 5, 6. Hollywood, Cal., 1915.)
 The Emu. (Vol. xv. pt. 2. Melbourne, 1915.)
 The Irish Naturalist. (Vol. xxiv. Nos. 10-12. Dublin, 1915.)
 Journal of the Federated Malay States Museums. (Vol. vi. pts. 2, 3. Kuala Lumpur, 1915.)
 The Scottish Naturalist. (Nos. 46-48. Edinburgh, 1915.)
 The South Australian Ornithologist. (Vol. ii. pt. 4. Adelaide, 1915.)

VIII.—*Letters, Extracts, and Notes.*

Pennant's Parrakeets.

SIR,—Last year I sent you an account of some Pennant's Parrakeets, bred at liberty, which left the nest in adult plumage. During the winter the female parent was accidentally killed, and the old cock mated with one of his daughters. The pair nested this summer, and the young showed the same peculiarity as before.

27 Sept. 1915.

Warblington House,
Havant, Hants.

Yours truly,

TAVISTOCK.

Distribution of the Crested Tit of Scotland.

SIR,—So far as my information leads me with regard to the Crested Tit stated to have nested in eastern Ross-shire, I corresponded direct with Alexander MacDonald of Balmagown, Ross-shire, quite 40 years ago. He had collected eggs of Crossbills and Siskins for Mr. Hancock of Newcastle, but not the eggs of the Crested Tit, which species he very distinctly informed me had never to his knowledge bred in Ross-shire, and he himself also assured me he had never met with the bird there. Mr. Lewis Dunbar, however, did obtain the clutch of eggs which was supplied by him to Mr. Gould, and for which that gentleman had offered a handsome reward—£5. It was Mr. Gould who would not credit the statement of Lewis Dunbar that Crested Tits bred in "Strathspey," or for that part of it, anywhere in Scotland! Lewis Dunbar was introduced to Mr. Gould by Mr. Snowie of Inverness in 1847.

In a note by Lewis Dunbar, in a copy of "The Fauna of the Moray Basin"—which belonged to him, but on his death passed into the hands of Mr. Gair of Thurso,—he clearly states:—"From 1817 to 1853 I was in business in Inverness, but visited Grantown during the summer." It was in 1848 he sent Mr. Gould the nest and eggs, and it was in Strathspey that he obtained them, as he himself assured me.

Mr. Ogilvie-Grant's record of the presence of Crested

Tits in eastern Ross-shire may, I think, safely be considered a very recent extension northward of the species. About the progress of its extension within the confines of Strathspey and tributaries of the River Spey, I had with considerable minuteness gathered all the data available many years ago, and had kept the subject up-to-date, to the issue of Buckley's and my 'Fauna of Moray.'

With reference to the entry in 'The Catalogue of the Collection of Birds' Eggs in the British Museum,' vol. iv. p. 304—"4. Ross-shire (*J. Hancock: Tristram Coll., Crowley Bequest*)"—I cannot help thinking there is some mistake here as to locality. The two persons' names who were associated with collecting done for Hancock and John Wolley were Alexander MacDonald of Balnagown, E. Ross-shire, and Lewis Dunbar. Most of the collecting by the latter at that period was confined to the Spey Valley and to taking eggs of Osprey, Kite, &c., and in response to Mr. Gould's offer of £5—a nest of four eggs of the Crested Tit. Hancock and Lewis Dunbar were together at an Osprey site at Glenmore, and it is possible, *indeed likely*, that on that occasion a Crested Tit's nest may have been found. I myself have found the nest of the species quite near to the said Osprey site!

Now that Mr. Ogilvie-Grant has recorded the appearance of the species in eastern Ross-shire, it may reasonably be expected that such an extension of range in autumn may, later on, result in true extension of nesting range; and the perfectly suitable woods and plantations of eastern Ross-shire and old-time haunts of the Crossbill and Siskin may come to be occupied by a species, whose past extensions have been fairly accurately traced from a comparatively small area in Speyside to cover many miles in length and breadth, and down the plateaus of Strathspey, even as far as Fochabers, and also over the valley's rims in several directions, and in the tributary valleys.

Dunipace, Stirlingshire,
Dec. 6, 1915.

Yours truly,
J. A. HARVIE-BROWN.

List of M.B.O.U. serving with H.M. Forces.—The following is a further list of names of Members of the Union serving, supplementing that published in October last.

A summary of the previous and present list shows :—

	October list.	January list.
Serving in the Navy	4	5
" France	6	5
" Egypt	3	2
" India	5	3
" British East Africa	2	1
" Gallipoli	1	1
" the British Isles	22	15
Killed in action	5	0
Prisoner in Germany	1	0
	—	—
	49	32
	—	—

Aldworth, T. P. Capt., 3rd Batt. R. West Kent. Attached 2nd Batt. Welsh Regt. (Wounded 9 May, 1915, in France.)

Bannerman, D. A. Owner-Driver, Red Cross motor-ambulance in France.

Betham, R. M. Brigadier-Gen., Commanding Ferozepore Brigade in India.

Blyth, R. O. Gunner, 3/1 East Anglian (Essex) R.G.A.

Brailward, A. C. Col., R.F.A., Commanding the Royal Artillery of the 69th (East Anglian) Division.

Bridgeman, The Hon. R. O. B. Commander, R.N., at sea.

Cameron, J. S. Major, 2nd Batt. R. Sussex Regt. In France, prior to July, 1915, at present on sick leave.

Drummond-Hay, J. A. G. R. Colonel, Commanding the Coldstream Guards and Regimental Distr. in London.

Floyd, J. F. M. Private, 16th Batt. Durham Light Infantry.

Hale, The Rev. J. R. Chaplain to the Forces, 4th Class. 202nd Brigade.

Hardy, E. C. Capt., R.N., Asst. Hydrographer of the Navy.

- Jones, H. K. Fleet-Surgeon, R.N., H.M.S. 'Duke of Edinburgh.'
- Kelsall, H. J. Lt.-Col., R.G.A., Commanding "Q" Siege Brigade at Lydd, Kent.
- Lucas, The Rt. Hon. Lord. Capt., Hampshire Yeomanry, attached to Squadron 14 of the R. Flying Corps, in Egypt.
- Magrath, H. A. F. Lt.-Col., Commanding 54th Sikhs F.F. Samana, India.
- Mathews, G. M. Private, Winchester V.T.C. (Twyford Section).
- Pease, Sir Alfred E., Bt. Officer-in-charge of the Guisborough Remount Depot, Northern Command.
- Pershouse, S. Major, Border Regt.
- Richardson, N. F. Lieut., R.A.M.C. Transport Officer, 1st South Wales Mounted Brigade Field Ambulance.
- Rippon, G. Lt.-Col., Commanding 2nd Line 8th (Irish) Batt. King's Liverpool Regt. in England.
- Rogers, J. M. Lt.-Col., served with 5th Res. Cavalry at York; also in Gallipoli, where wounded in September 1914.
- Sandeman, R. P. Lt.-Col., Commanding 2/1 Royal Gloucestershire Hussars.
- Someren, Dr. G. V. L. van. Capt., East African Medical Service in Br. E. Africa.
- Stanford, C. E. C. Fleet-Surgeon, R.N., at sea.
- Stanford, E. F. Farrier-Sergt., B Batt. Hon. Artillery Company in Egypt.
- Stanford, H. M. Lieut., R.F.A. 33rd Brigade. In France since November 1914. Awarded M.C. July 4, 1915.
- Stanford, J. K. 2nd Lieut., 3rd Batt. Suffolk Regt. In France attached 2nd Batt. and invalided home.
- Stenhouse, J. H. Fleet-Surgeon, R.N., at sea.

Wall-Row, J. A.B., Royal Naval Air Service, Anti-Aircraft Section.

Walton, H. J. Lt.-Col., I.M.S., serving with the 25th Cavalry on the N.W. Frontier, India.

Watt, H. B. Private, 1st (Hampstead) Battalion North London Volunteer Regt.

Wells, C. H. Serg., 12th (Service) Bat. York & Lanes. Regt.

Oological Dinner.—A dinner, to which many naturalists specially interested in Oology were invited, was held on Tuesday, Sept. 7th, at Pagani's Restaurant, London. The dinner committee consisted of:—Lord Rothschild, E. Hartert, E. C. Stuart Baker, Rev. F. C. R. Jourdain, P. F. Bunyard, and C. Borrer.

Among those present were the following gentlemen:—

Lord Rothschild; E. C. Stuart Baker; Staines Boorman; Clifford Borrer; A. C. H. Borrer; P. F. Bunyard; Dr. H. Coltart; C. W. Colthrup; H. Grönvold; Ernst Hartert; Cyril Hopwood; Rev. F. C. R. Jourdain; Herbert Langton; H. Munt; R. H. Read; W. E. Renaud; J. Wall-Row; Percy Smyth; R. E. Vaughan; G. Witherington; J. J. Baldwin Young.

Lord Rothschild took the chair at 7.30 o'clock.

The CHAIRMAN, in his opening remarks, stated briefly the objects of the present meeting. He said that hitherto the study of oology had scarcely received the attention which it deserved at the hands of scientific naturalists, and that many field-naturalists felt that annual (or possibly more frequent) gatherings like the present one, would give them opportunities of discussing oology, exhibiting rare eggs, and generally stimulate investigation in this branch of science.

Mr. CLIFFORD BORRER proposed a vote of thanks to the chairman for presiding at the dinner, which was unanimously carried. He added that a large number of field-naturalists had expressed their keenest regrets at being

unable to attend the inaugural meeting, and it was obvious that in normal times these gatherings would supply a long-felt want, and he trusted that all those interested in oology, whether members of the B. O. U. or not, would assist in making the movement a success.

Mr. PERCY F. BUNYARD exhibited the following eggs from his collection :—

Rock-Pipit (*Anthus spinoletta petrosus*). Two clutches of 5 eggs each, from Kincardine, showing true erythrism.

Common Nightingale (*Luscinia megarhyncha*). A clutch of 5 from Kent; ground-colour pea-green; markings, heavily capped with rich chocolate-brown, lower portion heavily blotched and spotted with a paler shade.

Spotted Flycatcher (*Muscicapa striata*). A clutch of 5 showing true erythrism, the normal greenish-blue tinge being quite absent.

Nightjar (*Caprimulgus europæus*). A very remarkable clutch from Kent; ground-colour creamy white; surface-markings consisting of a heavily pigmented large blotch of black-brown on the lower portion of each; the remaining markings consist of underlying conspicuous spots of pale grey. Size of the blotches are 0.40 by 0.33, and 0.55 by 0.50 inch.

Redshank (*Totanus totanus*). A clutch of 4 from Hampshire, with heavily pigmented caps of rich black-brown colour, the lower portions almost without surface-markings.

Also a clutch from Aberdeen of 4 eggs, resembling one type of the Greenshank (*Totanus nebularius*), except that the ground-colour is more ochraceous.

Common Snipe (*Gallinago gallinago*). A very beautiful variety-clutch of 3 from Suffolk; ground-colour pale greenish blue; surface-markings very few, of sepia-brown, and underlying markings greyish mauve.

Lapwing (*Vanellus vanellus*). A clutch of 5 from Hampshire with well-defined olive-green bands round the lower portion of each egg, otherwise quite normal.

Also a clutch from Kent, the lower portions of which are almost without pigment; the division between the pigmented and un-pigmented portions is sharply defined round the whole egg.

Knot (*Tringa canutus*). A clutch of 4 reputed Turnstone's eggs from North Iceland. These eggs are, however, quite unlike the eggs of this species, and are, in the opinion of the exhibitor, undoubtedly those of the Knot. They agree exactly with the description by Dresser ('Birds of Europe,' Eggs, p. 704) both in coloration and measurements as well as in weight, and are very much like two of those figured.

Description: ground-colour creamy white tinged with green. Surface-markings rich brownish black; these vary in size from a pin's head to a pea, and are mostly confined to the tops (apparently one of the characteristics of the Knot). Underlying markings greyish brown tinged with mauve; these are large and conspicuous, and also mostly confined to the broader half. Weight (average 4 eggs) 0.857 gr. They are very distinctive, and do not agree on comparison with any other eggs of the *Limicolæ*.

The CHAIRMAN exhibited:—

(a) A series of eggs of the Birds of Paradise, comprising a remarkable number of species.

(b) A series of eggs of the finches of the Galapagos Islands. These are extremely rare; the only other known specimens are believed to be those in the California Academy, as those in Nehrkorn's collection came from Tring.

Owing to changes going on in the Galapagos Islands, it is probable that these birds will shortly become extinct.

(c) A pair of perfectly spherical eggs, one of a Bustard from Nyasaland (*Lissotis melanogaster*), and one of a gigantic land-tortoise, for comparison of shape.

Mr. E. C. STUART BAKER exhibited a series of 30 eggs of *Gypaëtus barbatus*, taken (with one exception) in the Himalayas. The series included eggs which the exhibitor believed to be the largest and the smallest yet recorded, viz. 94.6 by

76.0 mm., and 76.5 by 62 mm. The series also contained eggs of remarkably deep coloration.

He also exhibited a series of eggs showing erythristic variation. The first group contained eggs which are so often of a red type that they could almost be considered a normal variation, such as *Sterna bergii*, *Pyctorhis sinensis*, *Dendrocitta*, and *Urocissa*, whilst the second contained eggs of which red varieties are extremely rare, such as *Sarciophorus*, *Corvus splendens*, and *Dumetia*.

Mr. G. WITHERINGTON exhibited a remarkably fine series of eggs of the common Merlin (*Falco aesalon*), together with a few selected clutches of the Kestrel (*Falco tinnunculus*), to demonstrate the complete similarity of certain types in these two species. All these eggs had been personally taken and identified by the exhibitor.

Mr. R. H. READ pointed out that size is a fairly accurate guide for identifying these eggs, and Mr. Bunyard and other gentlemen joined in the discussion, but it is interesting to notice that no one was able to point out which was which of the two species shown.

Mr. CYRIL HOPWOOD made remarks on the Shaheen Falcon (*Falco peregrinus peregrinator*) from the Chin Hills, and its eggs, drawing attention to the very small size of this bird's eggs when compared with those of the true Peregrine (*Falco peregrinus peregrinus*).

Dr. HERBERT LANGTON exhibited an interesting series of single eggs of the Lapwing and Redshank, mostly from Kent and Sussex. Some extraordinary varieties were among these. Also a series of Black Guillemots' eggs taken in the British Isles, including some very finely marked specimens.

Mr. R. H. READ exhibited a very large and beautifully constructed nest of the Mistle Thrush (*Turdus viscivorus*).

Also a series of clutches of white eggs of the following species :—Spotted Flycatcher, Bullfinch, Sedge-Warbler, Garden-Warbler, Lesser Whitethroat, Reed-Bunting, and Skylark. Mr. Read also showed a number of rare and

interesting nests, including that of a Great Tit, which had been built in the exceptional situation of an open bush. This series also included nests of the following:—Brambling, Mealy Redpoll, Black Redstart, Serin, Icterine Warbler, Rufous Warbler, Orphean Warbler, Wild Canary, Madeiran Golderest, &c.

Mr. BUNYARD stated that white eggs of the Common Skylark were very rare, and that a clutch of two in his own collection were the only specimens he had hitherto met with. He had in his possession, however, a clutch of three almost pure white eggs with slight markings of the Woodlark, taken in Suffolk.

Mr. W. E. RENAUD exhibited some interesting eggs, including fine clutches of the Gird and Yellow Buntings, and a perfectly even clutch of the Tree-Sparrow showing no odd egg.

Also clutches of Wheatear's and House-Martin's eggs, all clearly spotted with red, exceptionally rare in the latter species. Also a set of 3 eggs of the Kentish Plover of the rare greenish ground type.

The Rev. F. C. R. JOURDAIN exhibited a series of eggs of the Egyptian Vulture (*Neophron percnopterus*), taken personally on the Lower Danube and in Spain, illustrating the range of variation in the eggs of this species.

Mr. C. W. COLTHRUP exhibited the following eggs:—

(a) Lapwing. Variety-clutch of 4. Three of the eggs had a band of green round the centres, and the fourth a round green blotch on one side about $\cdot 75$ inch in diameter.

(b) Ringed Plover. A clutch of 5 eggs.

Also a variety-clutch, green at the narrow ends.

(c) Nightjar. Pinkish ground-coloured eggs, and a type-clutch for comparison.

(d) Common Partridge. An egg, green at the narrow end. Also 4 elongated and malformed eggs.

(e) Kestrel. A clutch of 6; four eggs normal, one cream-coloured with a few minute brown dots scattered over it, the sixth egg showing a pure white ground-colour at the larger end, the lower portion being blotched with red.

(f) Sparrow-Hawk. A clutch of 6, five of the eggs showing only underlying violet markings, the sixth heavily blotched with red surface-pigment.

Also a single egg of the same species, so heavily marked all over with red, that it might be mistaken for a Kestrel's, but for the blue ground-colour showing through.

Experiments on Homing.—Prof. J. B. Watson and Dr. K. S. Lashley* have recently made some important experiments at Bird Key, in the Tortugas, on the homing capacity of the Noddy Tern (*Anous stolidus*) and the Sooty Tern (*Sterna fuscata*), which breed there in large numbers. The island is peculiarly suitable for the purpose, since it marks the northern limit of the migration of these two tropical Terns (so that if the birds are experimentally transported further north, they find themselves in regions which they have not previously visited); moreover, on the westward side there is only the open water of the Gulf of Mexico until the shore-line of Texas is reached, Galveston being 855 statute miles distant. "This strip of open water proves a magnificent route for homing experiments." The authors caught Terns at their nesting-places, put individual marks of paint on their head and neck, tied a small tag recording the date, locality, and marking round the neck, fixed a larger duplicate tag beside the nest, transported the birds in large cages to a distance, liberated them, and watched for their return. The general result is of great interest:—"The Noddy and Sooty Terns can return from distances up to 1000 miles in the absence of all landmarks, at least so far as the term landmark is understood at present."

* Papers from the Department of Marine Biology of the Carnegie Institution at Washington. Vol. vii., "Homing and Related Activities of Birds." By J. B. Watson and K. S. Lashley. Pp. 1-104+7 plates+9 figs. (Washington: The Carnegie Institution, 1915.)

Some details of this careful piece of work may be noted, for they are very instructive. From Galveston (855 miles away) three birds returned out of ten, taking from about six to about twelve days; two Noddies liberated at 720 miles both returned, taking between eleven and seventeen days; out of ten birds liberated at 585 miles eight returned, taking from about four to about eight days; out of four Noddies and four Sooties liberated in open water 461 statute miles away, two Noddies returned in three days; of twelve taken north to Mobile, only one returned, taking about seven days; two Noddies and two Sooties carried in a state-room to Havana and released in the harbour there early in the morning of July 11, returned to Bird Key on the 12th, the distance in a straight line being about 108 statute miles; of three Noddies and two Sooties liberated off Cape Hatteras (850 miles to the north), both of the latter and at least one of the former species returned after several days. "The alongshore route, which is the one in all probability chosen by the birds on their return, since they were gone several nights, is approximately 1081 statute miles." (It seems that the birds almost never rest on the water, unless they happen to find pieces of driftwood or the like.) The records show that the Terns often take as long for short distances as for long distances, and that a return from the open sea outside of all landmarks is just as practicable as a return from a coast.

Notice to B.O.U. Members.—Members are reminded that the Annual Subscription to the Union, due on January 1st, is now *One Pound Five Shillings*, and the Secretary will be glad to receive same as early as possible.

A form of proposal for candidates for membership of the Union will in future be inserted in every issue of the 'Ibis.' If a member has anyone to propose for election at the Annual General Meeting, which will be held on March 12, 1916, the form should be duly filled up and returned to the Secretary, B.O.U., c/o Zoological Society, Regent's Park, N.W., before the 31st of January.

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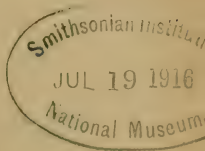
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IX.—*A List of Birds collected in Uganda and British East Africa, with Notes on their Nesting and other Habits.*—
Part I. By V. G. L. VAN SOMEREN, M.B.O.U.

(Plates IV.—VI.)

I HAVE thought it advisable to publish a short account of the birds collected by my brother and myself in Uganda and British East Africa, as some of those from the former place have been described by us quite recently, and others are new to the Uganda list. A large proportion of this collection was made in the forest-region between Jinja and Kampala. This list contains names of birds of which we obtained actual specimens or collected their nests and eggs.

Since writing the notes I have received a small collection of skins from my brother, which contains several species not included in this paper, and which will be reported on at a later date.

My thanks are due to Lord Rothschild, who kindly allowed me to work out my collection at Tring, and to Dr. Hartert and Mr. Ogilvie-Grant for much valuable help.

Two thousand five hundred specimens were collected, referable to 552 species and subspecies.

The arrangement and nomenclature follows that of Reichenow in his 'Vögel Afrikas,' to which a reference is given where the names do not correspond. In the case of species subsequently described, a reference to the original description is given.

The map (Pl. IV.) contains the names of most of the localities where collections have been made. The following places are all within a ten mile radius of Kyetema and cannot be shown on the map:—Kivuvu, Kami River, Namwave Forest, Lufumwe Hill, Kasala Forest, Kabamba, Kirerema, Mpumu, Magada, Sanga Forest, Kyungu.

Podiceps cristatus infuscatus.

Podiceps infuscatus Salvadori, Ann. Mus. Civ. Genov. (2) i. 1884, p. 251 : Abyssinia.

♂ 1-2 ; ♀ 1. 10. x. 10 ; 24. xii. 10.

Seen in fair numbers on the western lakes, very timid and difficult to procure. African birds do not appear to have a winter plumage. Birds shot in March, July, October, and December do not differ in plumage.

Localities. Toro Lakes, in Uganda.

Podiceps capensis.

♀. 3. xi. 12.

Common amongst the reeds, not seen on the open water, frequently observed in parties of six to eight.

Locality. Lake Nakuru, in British East Africa.

Larus fuscus.

Ad. and imm. 12. i. 11.

Common during the winter on all the large lakes.

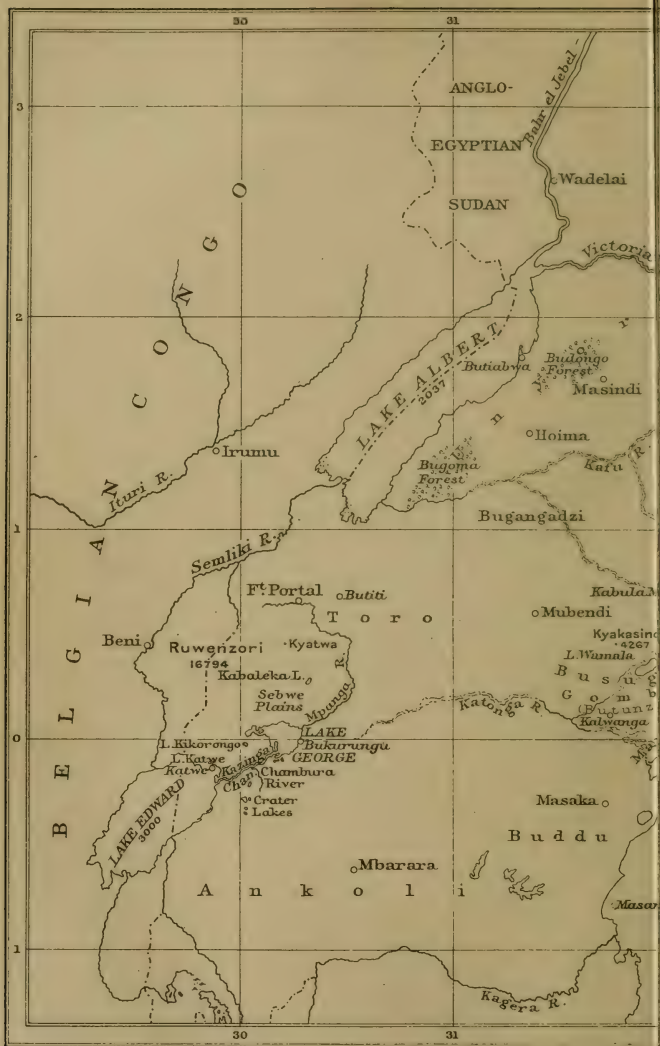
Localities. Victoria and Toro Lakes.

Larus cirrhocephalus.

Ad. and imm. 8. ix. 06.

These birds frequent the rocky islets of Lake Victoria in considerable numbers. They were breeding in August. The eggs were laid in a shallow depression in the earth or rock surface, little or no nesting-material being used. One or two eggs are laid, of a dirty olive-green or olive-brown





Sketch Map
of
UGANDA

to illustrate the paper
by
DR VAN SOMEREN

Statute Miles
10 0 10 20 30 40 50

Railways ———



ground-colour, with brownish-black blotches and greyish under-markings, scattered over the whole surface.

Localities. Bale (nr. Namasagali), Masambwa Isle, Victoria Nyanza, in Uganda.

Gelochelidon nilotica.

1-4; 1-2. 15.xi.10.

Common on the crater-lakes and Lake Edward. Both young and old birds were obtained.

Locality. Lake Edward, Uganda.

Hydrochelidon leucoptera.

1-3 ad.; 1 imm. 1.v.10; 19.ix.07; 5.xi.11; 8.ix.06.

Plentiful on the lakes at certain seasons.

Two of the males are in full plumage.

Localities. Kibanga, Sesse Isles, Butiabwa, in Uganda.

Phalacrocorax lucidus lugubris.

Juv. 17.i.14.

Nesting in large numbers on the rocky islands of Victoria Nyanza and on the stunted trees growing in the Nile below the Ripon Falls. Very common.

Locality. Lake Victoria, Uganda.

Phalacrocorax africanus.

1-2 ad.; 1 imm. 24.vii.07; 15.iii.10; 17.i.14.

1 ad. 21.vi.12.

Common on all the lakes and swamps where there are suitable surroundings. They are occasionally found far from water, perched on the flat-topped acacias.

They nest in trees.

Localities. Sesse Islands, Ripon Falls, Nambrizi, in Uganda; Kano and Kisumu, in British East Africa.

Pelecanus onocrotalus.

2 ad. 22.xii.10.

Two fine specimens of this large species were procured. The male, in fresh plumage, is a deep rosy pink. It had no excrescence on the upper mandible.

Localities. Lake George, in Uganda; Lake Nakuru, in British East Africa.

Pelecanus rufescens.

1 ad. 10. xii. 10.

A single specimen of the small African Pelican was obtained. It is in good plumage.

It was not very numerous at the time of our visit to the western lakes.

Localities. Toro Crater Lakes, Uganda.

Nyroca capensis.

1-2 ad. 10. x. 10 ; 25. x. 13.

These Ducks were met with in great numbers on the lakes in the western districts of Uganda and on the larger lakes in British East Africa.

October birds are moulting.

Localities. Toro Lakes, in Uganda ; Lake Nakuru, in British East Africa.

Anas sparsa.

♂. 4. ix. 10 ; 10. x. 10.

A few pairs were seen and procured on the lakes.

Localities. Buddu and Toro, in Uganda.

Anas undulata.

♂ 2 ; ♀ 1. 9. x. 10.

Many specimens of the Yellow-billed Duck were procured, but few preserved. A female, which had just finished breeding in October, is in heavy moult.

Localities. Toro Lakes, Uganda.

Anas capensis.

♂ 2. 29. ii. 13.

This small Duck was plentiful on the lakes in British East Africa. They are excellent flyers and keep well out of range when on the water, but are fairly easily procured at flighting-time.

Localities. Lakes Nakuru and Naivasha, in British East Africa.

Anas punctata.

♂ 1-2; ♀ 1-2. 22.xii.10.

All these birds are moulting and are in poor condition. They were seen in large flocks and were not difficult to procure.

Locality. Lake district, Ankoli, Uganda.

Anas acuta.

♂ & ♀. 14.xi.13.

These birds occur on migration, but are never plentiful.

Locality. Lake Nakuru, British East Africa.

Dendrocygna fulva.

♂ 1; ♀ 1-2. 15.x.13.

Not very common; they were found breeding near Lake Magadi.

Localities. Lakes Nakuru and Magadi, British East Africa.

Nettopus auritus.

♂ 1-2. 4.ix.10; 12.v.06.

These little birds were seen in small flocks along the lake-shore and on the islands of Victoria Nyanza.

Localities. Buddu, Buvuma Island, and Kibanga, Uganda.

Chenalopex ægyptiacus.

♂ & ♀; nestlings 2. 3.vii.06; 30.ix.06.

A common bird on the lakes and swamps. It was frequently found along the rivers, and on the open plains when the grass is short and green. These birds are good tree-perchers.

Localities. Toro, Jinja, Lake Victoria, Uganda; Lakes Nakuru and Naivasha, in British East Africa.

Plectropterus gambensis.

♂ 2; juv. 1. 6.xi.10; 20.vi.13.

These birds were found breeding in the swamp at Lake Nakuru, in September. Quite a common species.

Localities. Kasaka and Jinja, in Uganda; Lake Nakuru, in British East Africa.

Glareola nuchalis.

♂ 1-2. 31.vii.06; 17.i.12.

♀ 1-2. 17.i.12.

I cannot see any difference between *G. emini* and *G. nuchalis*. These birds were seen in pairs along the shores of Victoria Nyanza and on the Nile below the Ripon Falls at Jinja. They were breeding in January and June.

The eggs were deposited on the bare rock, usually in a fairly sheltered corner. The clutch usually consists of three eggs, of a sandy ground-colour, spotted and streaked with black or very dark brown. The birds are close-sitters.

Localities. Jinja, Buddu, and Kibanga, in Uganda.

Cursorius temmincki.

♂. 2.xi.10.

A male in rather worn plumage was procured in western Uganda. Several pairs were seen on the plains round Nairobi.

Locality. Izinga Isle (nr. Buvuma), Uganda.

Charadrius asiaticus.

♂ 1-4. 20.iv.10; 4.i.13.

♀ 1-2. 4.i.13.

A common migrant, found in considerable numbers on the open plains where the grass is short and not too thick. In the series procured in January, the birds were in different stages of moult, no two being alike; they vary from full summer to full winter plumage. The male, shot in April, is in summer dress.

Localities. Mpumu, and Jinja, in Uganda; Lakes Nakuru and Elmenteita, in British East Africa.

Charadrius pecuarius.

Charadrius varius Vieill.; Reichenow, Vög. Afr. i. p. 177.

♂ 1-2. 19.ix.06; 15.i.10.

♀ 1-2. 4.viii.06; 19.ix.06.

Not very common; a few pairs were seen along the north-west shore of Victoria Nyanza and Lake Edward.

Localities. Lake Edward and Buddu, in Uganda.

Charadrius hiaticola hiaticola.

♂ 1-2. 14. xii. 10.

A winter migrant, not very common.

Localities. Toro Lakes, Uganda.

Charadrius tricollaris.

♂ & ♀ ad. ; 2 imm. ♀ . 31. vii. 06.

The adults are in good plumage, the young are in first dress.

Locality. Buddu, in Uganda.

Stephanibyx inornatus.

♀ 1-2. 17. v. 10 ; 22. v. 10.

Not very plentiful ; found on the dry sandy plains and country where the grass has been burnt off.

They are noisy during flighting-time.

Localities. Kikoma and Nambrizi, in Uganda.

Defilippia crassirostris.

Hemiparra crassirostris (Hartl.) ; Reichenow, Vög. Afr. i. p. 184.

♂ . 14. v. 06.

♀ 1-2. 22. v. 10.

These birds frequent the lake-shore and the open country. They are not very numerous.

Localities. Lake George and Jinja, in Uganda.

Hoplopterus spinosus.

♂ 1-3. 19. ix. 06 ; 12. xii. 10 ; 13. xii. 10.

♀ 1-2. 19. ix. 06. Imm. 19. ix. 06.

Common on the flats by the lakes and on the open plains. The immature specimen is in partial brown plumage and is very worn.

Localities. Kikorongo, Buddu, and Lake George, in Uganda.

Hoplopterus speciosus.

♂ . 10. ix. 12.

Common on the plains, especially when the grass has been

burnt off. They are wild and very noisy at flighting-time. Their cries may often be heard during the night.

Localities. Elmenteita and Nakuru, in British East Africa.

Sarciophorus superciliosus.

♀. 10.xii.10.

A single example of this rare and interesting species was obtained. The chestnut of the forehead and crop is very much darker than in a specimen from the West Coast.

Locality. Kikarongo, in Uganda.

Lobivanellus lateralis.

♂ & ♀. 22.ii.11; 29.vii.06.

Not very common. A nest was found in August containing three eggs of a pale olive-brown colour, blotched and marked with black and dark brown.

Localities. Kabaleka and Buddu, in Uganda.

Ædicnemus œdicnemus.

♀. 17.i.13.

A pair was seen on the newly burnt land at Elmenteita; they were very wild and difficult to approach.

Locality. Elmenteita Plains, British East Africa.

Ædicnemus vermiculatus.

♂ 1-2. 21.vii.06; 20.ii.11.

♀. 14.viii.06.

A common species. Found nesting on the sandy shore of Victoria Nyanza and on the rocky islets below the Ripon Falls at Jinja, in January, August, and October.

Localities. Kabaleka Lake, Jinja, and Buddu coast, in Uganda.

Himantopus himantopus.

♂ 1-2; ♀ 1-3. 25.xi.10.

These birds were very common during the winter months on the western lakes and on the lakes in British East Africa.

Localities. Toro, in Uganda; Lake Nakuru, in British East Africa.

Numenius phaeopus.

♂. 19. vi. 06.

A single specimen was seen and obtained.

Locality. Buddu coast of Lake Victoria, Uganda.

Totanus pugnax.

♂ 1-3; ♀ 1-4. 18. xi. 10.

Hundreds of these birds, along with other Waders, were seen on the shallow crater-lakes. They were in various stages of plumage.

Localities. Western Lakes, Toro, Uganda.

Totanus stagnatilis.

♂ 1-2. 24. xi. 09; 15. xii. 12.

Exceedingly common as a migrant during the winter months. They frequent the lakes and swamps.

Localities. Kyetema swamp, in Uganda; Lake Nakuru, in British East Africa.

Totanus glareola.

♂ 1-2; ♀ 1-2. 18. xi. 10.

Always plentiful during the winter months, on the lake-shores and swamps.

Localities. Butiabwa, in Uganda; Lake Nakuru, in British East Africa.

Totanus hypoleucus.

♀ 1-3. 26. ix. 10; 19. vi. 06.

Occurs as a migrant, but is also a resident breeding-species.

Localities. Kyakasindula, Buddu, in Uganda; Lake Nakuru, in British East Africa.

Calidris arenaria.

♂. 8. x. 06.

A male in full winter coat and in good condition.

Locality. Buddu coast, Uganda.

Tringa subarquata.

♂ & ♀. 28. xii. 10.

Both in good plumage and condition.

Locality. Lake Edward, Uganda.

Gallinago gallinago.

♂. 17. xii. 12.

These birds are frequently shot along with *G. nigripennis*. They were especially common in swamp-country.

Locality. Lake Nakuru, in British East Africa.

Gallinago nigripennis.

♂ & ♀. 14. vi. 14.

Common at certain seasons. Found in swamp by rivers and lakes.

Locality. Lake Nakuru, in British East Africa.

Rostratula capensis.

Rostratula bengalensis (Linn.); Reichenow, Vög. Afr. i. p. 237.

The Painted Snipe is a resident and breeding-species in British East Africa.

Locality. Kyambu Swamp, British East Africa.

Otis melanogaster.

♂ 1-2. 27. ix. 06; 15. vii. 11.

♀. 27. ix. 06.

A common species in the game-country and acacia-lands. We have taken their eggs on several occasions. No attempt is made at nest-building, the egg is laid on the bare ground.

Localities. Bale (ur. Namasagali) and Toro, in Uganda; Nakuru, in British East Africa.

Balearica pavonina.

♂ 2 imm. 27. vii. 12.

Common. We have taken their eggs in June and July. The nests were built amongst the reeds in a swamp. The eggs are pale when first laid, but soon become a dirty brown.

Localities. Kano and Nairobi, in British East Africa.

Actophilus africanus.

♂ 1-5. 14. vi. 06; 1. v. 10; 14. xi. 09; 17. v. 11.

♀ 1-2. 17. i. 14.

Very common on the shores of Lake Victoria. Young

birds do not have the silky yellow feathers of the crop well developed. The sexes are alike. Nests and eggs have been taken in June, from the shallow reed-beds at the lake-side. The eggs are a bright or dark ochraceous ground-colour, with numerous streaks and vermiculations in black; they are glossy and very pointed at one end.

Localities. Jinja, Kibanga, and Toro, in Uganda.

Limnocorax niger.

♂. 9. x. 10.

♀ 1-3. 14. iv. 09; 4. vii. 06; 9. x. 10.

Common in the reed-beds of rivers, lakes, and swamps. We have taken their eggs in February, March, and June. Nestlings are black with delicate flesh-pink bills with black tips, the legs are fleshy-brown.

A bird shot in April is moulting from the second to fully adult plumage.

Localities. Toro, in Uganda; Nairobi, in British East Africa.

Sarothrura pulchra centralis.

Sarothrura pulchra centralis Neumann, Bull. B. O. C. xxi. 1908, p. 45 : west of Lake Albert.

♂ 1-9; 14 imm. 2. ix. 13; 3. ix. 13; 27. ix. 13; 8. xii. 14; 17. i. 14; 6. xi. 14; 14. x. 13; 6. xi. 13; 14. x. 13.

♀ 1-4; 2 imm. 6. xi. 14; 3. ix. 13; 6. xi. 14; 3. ix. 13.

This large series includes young of both sexes. The youngest bird is very like a female in coloration, but is duller in every way, and the barring of the upper and under surfaces much closer; the brown feathers of the head, neck, and breast are tipped with blackish brown; the tail is chestnut barred with black. Young males of the same age are lighter below than females, and have the feathers of the back and wings spotted with rusty or whitish as well as being tipped with rusty.

Very young birds were shot in September, and moulting birds in October.

Localities. Mabira and Kyetema Forests, in Uganda.

Sarothrura bonapartei.

♂. 20. ii. 12.

This is an interesting bird. It is very much darker than *S. bonapartei* from the type-locality. The chestnut of the fore-part is deep; the throat is not pale. Two specimens from the same locality are alike.

It is a rare bird, frequenting the forests and forest-streams.

Locality. Kyetema, Kiagwe, in Uganda.

Sarothrura elegans reichenowi.

Sarothrura elegans (A. Smith); Reichenow, Vög. Afr. i. p. 287 [part.].

♂. 20. ii. 12.

This species is very near *S. elegans elegans*, but the brown of the foreparts is darker; the throat is not pale. The spotting on the back is paler and larger; in some specimens the spots on the wings are almost white. The spotting on the under surface is not so well defined, but is irregular and broken up. The bill is slightly shorter and deeper. A rare species.

Locality. Kyetema Forest, Kiagwe, in Uganda.

Porphyrio porphyrio.

♂ & ♀. 14. vi. 06.

Found in the dense reed-beds of the larger swamps.

Locality. Lwala, in Uganda.

Porphyrio alleni.

♂ 1-2 ad.; 1-2 imm. 17. vi. 06; 24. vii. 12.

The Blue Waterhen is fairly abundant in the swamps and reed-beds. A nest of this species was found in September. The eggs are a pinkish creamy-white with red-brown and greyish spots.

Localities. Lwala and Jinja, in Uganda; Kisumu and Lake Nakuru, in British East Africa.

Gallinula chloropus meridionalis.

Stagnicola meridionalis Brehm, Vögelf. 1855, p. 331: South Africa.

♂ 1-2 ; ♀ 1. 9. x. 10.

A common species, rather more skulking in habits than the European species. Resident and breeding. Specimen 1 has white on the throat, breast, and abdomen ; No. 2 has a few feathers on the abdomen edged with white ; No. 3 has a uniform under surface. All have wide white flank-markings.

Localities. Toro Crater Lakes, in Uganda ; Lake Nakuru, in British East Africa.

Fulica atra cristata.

♂ & ♀ . 10. x. 10.

Common, especially on the lakes in western Uganda.

Localities. Toro Lakes, in Uganda ; Lake Nakuru, in British East Africa.

Ibis æthiopica.

♂ 1-2 ; ♀ 1. 21. xi. 10.

These birds were seen in considerable numbers on the rocky islands of Victoria Nyanza. They nest on these islands and on the lake-shore.

Localities. Victoria Nyanza, Kasaka, in Uganda ; Lake Nakuru, in British East Africa.

Hagedashia hagedash.

♂ & ♀ . 14. ix. 06.

Common in the acacia-country, by lakes and swamps. They were breeding in October and September.

The eggs vary in colour from a pale dirty greenish white with pale brownish blotches and markings, to brownish olive with large dark brown blotches and mottlings. The young nestlings are black with greyish-black down.

Localities. Toro, in Uganda ; Lake Solai, in British East Africa.

Plegadis falcinellus.

♀ . 15. ix. 13.

A single specimen was shot in the swamp in the Nakuru district.

Locality. Lake Solai, in British East Africa.

Turnix nana.

♂. 4.v. 10.

This is not a common species. A few are occasionally flushed in the old deserted native gardens. This specimen is in worn plumage and is very pale.

Locality. Mpumu (nr. Kyetema), in Uganda.

Tantalus ibis.

♂ 1-2. 8.xii. 10 ; 1.xii. 10.

♀ 1 ; imm. 1. 8.xii. 10.

Fairly common on the lakes in western Uganda. The immature bird is in the brown plumage, and has a horn-coloured bill.

Localities. Katwe and Chambura River, in Uganda.

Anastomus lamelligerus.

♂ & ♀. 19.viii. 11 ; 15.vii. 12.

I was surprised to find that these birds are great scavengers. A pair visited the slaughter-shed at Kisumu every morning at 5.30 and sat on a tree close by, and waited until the killing and disembowelling was over. They then swooped down on to the refuse, accompanied by dozens of the common Brown Vulture.

Localities. Kabaleka Lake, in Uganda ; Kisumu, in British East Africa.

Leptoptilus crumeniferus.

♂ & imm. 19.viii. 11.

Common at certain seasons. Also a great scavenger.

Locality. Crater Lakes, Toro, Uganda.

Mycteria senegalus.

♂ juv. October 1910.

A single specimen, in the brown plumage of immaturity. Not at all common.

Locality. Ankoli, in Uganda.

Abdimia abdimii.

♂ 1-2. 21.xi. 10.

Seen occasionally by the banks of rivers and along the

lake-shore. They were seen nesting at Gondokoro down the Nile.

Localities. Buvuma Island and Kulwe Lake, in Uganda.

Ciconia ciconia.

♂. 17. xii. 12.

A large number of these birds were seen near a grass-fire on the Elmenteita Plains.

Locality. Nakuru, in British East Africa.

Ciconia nigra.

Several were seen, but none obtained.

Localities. Nakuru, in British East Africa; White Nile, in Uganda.

Phœnicopterus minor.

♂ 1-5. 22. xi. 10; 1. xi. 10; 11. ix. 06.

♀ 1-2. 21. xi. 10.

Plentiful on the lakes in western Uganda and on the larger lakes in British East Africa. These birds had nests in Kabaleka Lake, consisting of raised platforms of mud standing in the shallow water. Unfortunately at the time of our visit there were no eggs. A female specimen procured is almost pure white.

Localities. Kabaleka Lake, Toro, in Uganda; Lakes Nakuru and Naivasha, in British East Africa.

Scopus umbretta bannermani.

Scopus umbretta bannermani C. Grant, Bull. B. O. C. xxxv. 1914, p. 27: British East Africa.

♂ & juv. 15. ix. 10; 15. vi. 10.

Fairly common. Builds a huge nest of many compartments, composed of twigs, grasses, and reeds. The eggs are white, but become discoloured by the dirt from the birds' feet and feathers. They have been taken in June and November, and nestlings in June. These birds frequent the swamps, rivers, and lakes. They roost in trees, selecting a favourite spot to which they return every evening at a fixed time.

Localities. Buddu, Kyetema, in Uganda; Lake Nakuru and Nairobi, in British East Africa.

Ardetta payesi.

♂ juv. 17.vi.06.

A young specimen, probably of this species, was caught amongst the thorny trees growing in the lake at Bugunya. Wing 120 mm.

Locality. Bugunya, in Uganda.

Erythrocnus rufiventris.

♂. 18.viii.06.

Not a common species. Frequents the trees and swamps by the lake-side.

Locality. Kagera, in Uganda.

Butorides atricapillus.

♂ 1-3. 17.vi.06; 6.v.11; 4.iii.11.

♀ & ♂ juv. 17.vi.06.

The little Green-backed Heron was common in the trees bordering on Lake Victoria. Nesting-birds were obtained in June, and eggs in October. The eggs are pale greenish blue and small in size. The nest is composed of twigs laid loosely together. Young birds have the feathers of the mantle and wings heavily edged with pale rusty.

Localities. Buddu, Katai, Jinja, and Toro Crater Lakes, in Uganda; Lake Nakuru, in British East Africa.

Ardeola ralloides.

♂ 1-3; ♀ 1. 5.ii.11; 20.viii.06; 10.vii.14; 20.viii.06.

Fairly common. A young bird was shot in August. These birds are usually seen perched on trees by the side of rivers and swamps.

Localities. Rock Seb, Victoria Lake, Toro Lakes, in Uganda; Kijabi, in British East Africa.

Ardea goliath.

A fine male, in good plumage, was seen on the Nile below the Ripon Falls.

Locality. Jinja, in Uganda.

Ardea purpurea.

♀. 8. xii. 10.

A fine bird, in good condition. Not common. The Purple Heron frequents the shores of the larger lakes.

Locality. Kulwe Lake on Buruma Isle, in Uganda.

Ardea melanocephala.

♂. 24. vii. 12.

A male, in full plumage, with long head-plumes. Quite a common species. Eggs have been taken in June and July.

Localities. Kampala and Kyetema, in Uganda; Kano, in British East Africa.

Bubulcus ibis.

♂ 1-4. 1. v. 10; 6. xii. 10; 6. xii. 10; 6. xii. 10.

♀ 1-3. 21. xi. 10; 6. xii. 10; juv. 21. x. 14.

Common everywhere where the country is suitable. Every cattle "Boma" has its flock of Herons. Very young birds were shot in October; birds in full plumage, with good body- and head-plumes, were obtained in May and December. In one male the plumes are yellowish buff, in another they are decidedly pinkish. Birds without any plumes were procured in December and October.

Localities. Kisumu and Embu, in British East Africa; Lake Edward, Kazinga, Kibanga, and Jinja, in Uganda.

Egretta garzetta garzetta.

♂ & ♀, & nestling. 21. xi. 10; 14. vi. 10; 14. vi. 10.

This Egret is plentiful in certain districts, but scarce in others. The bird shot in November has good body-plumes, but those of the crown are missing. The male has a crest of 160 mm., the crop-plumes are rather worn, but those of the back are very long. These birds were nesting in June; the eggs are pale blue. The young bird still retains the downy tips to the feathers of the neck, head, and breast. Adults have a wing-measurement of 285 mm.

Localities. Damba Island, Lake Victoria, Kazinga Channel, in Uganda.

Herodias alba.

♂ & ♀. 10.vii.13; 21.xi.10.

Two specimens were obtained. The wings are 386 and 384 mm.; bill yellow, legs black.

Localities. Kazinga Channel, in Uganda; Lake Solai, Nakuru, in British East Africa.

Vinago waalia.

♀. 16.iv.11.

The Yellow-bellied Fruit-Pigeon was met with in the Nile district. In habits it resembles the common Green Pigeon. It was breeding in April. The eggs are white and glossy. The nest was built in a low acacia.

Locality. Zombeki River, in Uganda.

Vinago calva salvadorii.

Vinago calva nudirostris Swains.; Reichenow, Vög. Afr. i. p. 396 [part.].

♂ 1-6. 17.i.14; 29.vii.06; 29.vii.06; 7.xi.14; 7.xi.14; 2.ii.09.

♀ 1-3. 29.vii.06.

Found commonly in British East Africa and Uganda. They are present in greatest numbers when the fig season is on.

The nest in the lower trees in the forests; the nest is constructed of twigs loosely placed together. The eggs are pure white; two are laid. We have taken the eggs in February, June, September, and November.

In this series of nine birds all show a broad grey band on the lower neck, except in a young bird, where it is entirely absent.

Localities. Sesse Islands, Kyetema, Kagera, Mabira, Sezibwa, in Uganda; Embu and Nairobi, in British East Africa.

Columba uncinata.

♂. 10.i.12.

This bird, which is rare in collections, inhabits the tall trees in the large forests, and is difficult to procure. Its

call is a loud "coo." These birds usually go in pairs, and are very wild.

Localities. Mpumu and Mabira, in Uganda.

Columba guinea longipennis.

♂ & ♀. 20.iii.11.

An adult pair was obtained in western Uganda, the only place where they were seen. Wing 230 mm.

Locality. Kigalama, Toro, in Uganda.

Columba arquatrix.

♀. 2.xi.13.

The Yellow-legged Pigeon is fairly plentiful in the forests round Nairobi. These birds when freshly killed have a beautiful bloom all over the feathers, which is lost after preparation. The bird obtained in November had large ovaries.

Localities. Nairobi and district, and Nakuru, in British East Africa.

Turtur senegalensis.

♂ & ♀. 18.vi.12; 4.xii.10.

This is a common species in the scrub-country and round native villages. They are as plentiful and as tame as sparrows in the native quarter at Kampala.

A large number of nests, with young and eggs, were found in the scrub-country round Kisumu, all the nests being placed in low trees. The nest is a flimsy structure. Young birds are rusty-brown in colour, with heavy black bars and mottlings.

Localities. Mohokya and Kampala, in Uganda; Kisumu, in British East Africa.

Turtur capicola tropica.

Turtur capicola tropica Reichenow, Orn. Monatsb. xiii. 1902, p. 139: British East Africa.

♂ 1-2. 9.x.10; 7.i.12.

A common species, frequenting the scrub. Nests have been found in March, June, July, and November.

Localities. Mohokya and Namumira, in Uganda.

Turtur lugens.

♂ 1-7. May to July, 1913.

♀ 1-4. May to August.

Large numbers of these Doves frequented my garden. They had eggs and young in March, May, November, and December.

The young differ from the adults in being of a duller, dirtier grey, in being more ochraceous on the under surface, and in having the feathers of the mantle and wings edged with buff or whitish; the speckling on the side of the neck is entirely absent or only faintly indicated.

Localities. Kyambu and Nairobi, in British East Africa.

Turtur semitorquatus.

♂ 1-2. 6.v.10; 18.xii.14.

♀ 1-3. 31.v.12; 12.i.11; 3.xii.10.

Common. Nests, with eggs or young, have been found in nearly every month of the year. One specimen from Ankoli and two from the Kivu district have dark grey heads and ear-coverts and paler grey throats; the under surface is very much paler than in typical *T. semitorquatus*. The wings are a lighter brown, and the under tail-coverts are pale grey edged with white. Wings 155-165 mm. in adult birds.

Localities. Buzeranjovu, Kyetema, Gondokoro, in Uganda; Embu and Nairobi, in British East Africa.

Aplopelia larvata.

♂ & ♀ imm. 7.v.14.

The Green-necked Dove is not common. They were nesting in March, and young birds in first plumage were taken in May.

Locality. Nairobi, in British East Africa.

Chalcopelia chalcopsilos.

Chalcopelia afra (Linn.); Reichenow, Vög. Afr. i. p. 426 [part.].

♂ & ♀. 5.iii.14; 10.v.14.

These are quite the prettiest of the Ground-Doves. They

are fairly common, and were nesting in July. Young birds were collected in July and August.

Locality. Nairobi, in British East Africa.

Chalcopelia afra afra.

♂ 1-2; 1 imm. 7.xi.14; 4.v.12; 18.x.10; 24.ii.11.

♀ 1-3. 4.v.12; 21.ix.10; 6.v.10.

This is the common Ground-Dove. They are usually seen in pairs feeding on the roadsides or on the open spaces in the bush-country. Birds with blue spots, green spots, and bronzy spots on the wings occur together.

In the north of the Nile Province a pale form is met with, *C. afra delicatula* Sharpe, 1902.

Nests and eggs have been taken in May, and nestlings in February, and young in moult in October.

Localities. Magada, Sanga, Kyetema, Kyanja, and Busiro, in Uganda; Kisumu and Mumias, in British East Africa.

Tympanistria tympanistria.

♂ 1-2; 1 imm. 27.iv.12; 10.xi.14; 5.xii.13.

♀ 1-2. 3.ii.12; 6.xii.14.

This is a common species in forests and plantations. They collect most of their food from off the ground. Their call is a sweet sound, unlike that of other Doves; the first two coos are loud and prolonged, followed by seven coos, gradually diminishing in intensity and tone, so that the last is almost inaudible. Nests and young were taken in July. The nest is constructed of twigs loosely put together, and is usually placed about twenty feet from the ground. The eggs, two in number, are small and have a pinky-creamy tinge.

A young bird in moult from first to adult plumage, shot in November, is very like a female in appearance, but the crown and back still retain feathers which are tipped and barred with rust-colour; the breast and flank-feathers are also edged with yellowish brown. The wing-spots are indicated by dull blackish spots.

Localities. Mabira, Sezibwa River, Kyetema, and Kivuvu, in Uganda; Kyambu and Nairobi, in British East Africa.

Æna capensis.

♂ 1-2; 1 imm. 8.x.07; 15.vii.12; 19.vii.12.

♀ 1-2. 15.vii.12; 10.xi.10.

The little Long-tailed Ground-Dove is common in the scrub-country round Kisumu. It is less common in Uganda. A nest with two eggs was found on the top of an ant-heap, overgrown with weeds; the eggs are small, with a matt surface, of a creamy-colour. This was found in March, and young nestlings in June. Young in moult were collected in July and November.

Localities. Kyetema, Kalwanga, and Jinja, in Uganda; Kisumu, in British East Africa.

Numida ptilorhyncha major.

♂ 1-2. 14.viii.09; 4.ii.11; 14.ii.14.

♀. 4.ii.11.

Common in forest and scrub-country, along the wooded edges of swamps and rivers. Young birds were procured in March and July.

Localities. Kikarongo, Kyetema, and Mabira, in Uganda.

Numida ptilorhyncha reichenowi.

♂ 1-2. 20.vi.13.

♀ 1. 10.xii.12.

Numerous along the road to Embu in the Kenia district, in flocks of 25 or more. Young in first plumage were secured in June and July.

Localities. Embu, Nyeri, Kikuyu, in British East Africa.

Guttera cristata seth-smithi.

Guttera cristata seth-smithi Neumann, Bull. B. O. C. xxiii. 1908, p. 13: Unyoro.

♂ 1-2; ♀ 1; imm. 1. 15.ii.11; 15.ii.11; 17.i.14.

The Lesser Blue-spotted Guinea-fowl is found only in the large forests. It feeds and roosts in small flocks of six to ten individuals, and is difficult to obtain.

Young birds in first plumage were obtained in March, and eggs in January. The eggs are large and pure white, with a pitted matt surface. We obtained an egg from the

oviduct of the January bird ; it was fully formed and ready for depositing.

Localities. Durro (nr. Lake George) and Mabira Forests, Uganda.

Pternistes infuscatus.

♂ . 10. vi. 13.

♀ & imm. 13. vii. 13.

I can see no reason for separating the birds from Kenia district under the name *P. i. keniensis* ; specimens shot in the Kikuyu district are just as ochraceous—in fact, the coloration is variable.

These birds are plentiful in the native gardens, where grain and sweet-potatoes are cultivated. They were seen in large numbers along the Forthall-Nyeri Road in British East Africa.

Young birds are much darker on the upper surface than adults, and are more marbled and are paler on the under-side. The bare throat is limited in extent and is dirty yellow, not orange and yellow. Both males and females call.

When flushed, these birds frequently fly up into trees and remain perfectly still until danger is past.

Localities. Forthall, Nyeri, Kyambu, and Kikuyu, in British East Africa.

Pternistes cranchi.

♂ 1-3. 26. v. 10 ; 4. ii. 11 ; 4. ii. 11.

♀ 1-2. 26. v. 10 ; 4. ii. 11.

These birds are found in the bush-country in pairs or coveys, but are never abundant. They are extremely fond of perching on the top of some prominence, such as an ant-hill, just before sunset, and calling loudly.

A young male, moulting into its second plumage, has the throat almost entirely covered with feathers ; it retains the broadly marked feathers of the coverts and secondaries, and also the pale whitish feathers of the under surface, which are broadly banded with pale brownish and possess a terminal black spot. Here and there on the breast, the

fresh vermiculated feathers of the second or intermediate plumage are making their appearance. In this intermediate plumage, which a bird assumes at the end of the first year, the vermiculations of the breast-feathers are not so dark as in the adult, but are broader: these feathers also have a broad, dark shaft-streak. The feathers of the mantle have dark shaft-streaks, while the black on the uppermost secondaries is most conspicuous and not confined to the inner web or shaft, as in adults, but extends to the margin of the outer web. There are no signs of rufous edgings to the breast-feathers. From observations made on *F. schuetti*, it would appear that this intermediate plumage is retained until the end of the second year, at which time the bird would moult into the full adult plumage.

Localities. Kalwanga, Fort Portal, and Toro district, in Uganda.

Francolinus schuetti.

♂ & ♀. 1.i.12; 16.iv.10.

Met with in the rough lands near native cultivations. It is a noisy bird, especially towards evening, when it will perch on some ant-hill or other prominent position and call loudly. They are very much commoner in British East Africa than in Uganda. They usually go in pairs. When flushed they usually make for the nearest tree. They are heavy flyers and easy to shoot. They nest twice a year; the nest is placed under a tuft of grass or small bush; the eggs are sandy to buff in ground-colour with pitted surface. They have very hard shells. We have taken the eggs in nearly every month of the year, but nests are most numerous from May to July and December and January.

Localities. Mpumu, Kyetema, and Kasaka, in Uganda.

Francolinus icterorhynchus.

♂ 1-2. 13.ii.10; 3.v.11.

♀ 1-2. 13.ii.10; 10.vii.14.

Two of these birds agree perfectly with Neumann's *F. i. ugandensis* from Mondo, Uganda Province. This subspecies was described from a single specimen, now in the Tring

Museum. Two others from the same locality as the previous couple agree well with Neumann's *F. i. emini*. These birds have wings of 172 and 186 mm. in males, and 162 and 170 mm. in females. Neumann gives 185 mm. as the measurement of *F. i. ugandensis*. I have examined his type and cannot, even with pressure, bring the length to this figure, but make it 182 mm. on the right and 178 mm. on the left side. I consider his bird to be the same as *F. i. emini*, and *F. i. emini* to be hardly separable from *F. i. icterorhynchus*.

A specimen obtained by Boyd Alexander in the Bahr-el-Ghazel, in the Tring Museum, has a wing-measurement of 185 mm. C. Grant, in the 'Ibis' of Jan. 1915, gives the wing-measurements of true *F. i. icterorhynchus* as 159–167 mm. Two specimens, collected by Seth-Smith at Nimule and Masindi in the Nile Province, agree well with Alexander's specimen in colour, and they have wings of 182 and 186 mm. respectively. Two specimens, collected by Ansorge in Unyoro, have wings measuring 176 and 177 mm.

The plumage of this Francolin varies so much according to season and age that it would appear doubtful whether the subspecies named can stand.

These birds were met with in the scrub-country and near native cultivations. Nests and eggs were taken in May and June, and young, of about two weeks old, in July.

Localities. Mpumu, Kyetema, Kasala, and Kampala, in Uganda.

Fringillus mulemæ.

Fringillus mulemæ O.-Grant, Bull. B. O. C. xiv. 1903, p. 30: Mulema, Uganda.

♂. 13. ii. 10.

Not very common, found in the scrub and cultivations.

Locality. Mpumu, in Uganda.

Fringillus uluensis.

♂ & ♀. 10. vi. 13.

A covey of seven was flushed on the road to Forthall. They were lying up in the long grass, and, when disturbed,

did not fly far, but, after alighting, ran for a good distance and lay close. I was able to walk right up to them before they again took flight. They were common in this locality.

Locality. Kenia Province, in British East Africa.

Francolinus hubbardi.

♂ & ♀. 3. ix. 13; 29. viii. 12.

This Francolin was common in the grass- and acacia-country, occurring in pairs or small coveys. They were breeding in June, and young birds were caught in July and October.

Localities. Nakuru and Elmenteita, in British East Africa.

Francolinus granti.

♂ 1-3. 10. vi. 13; 15. iii. 12; 20. iv. 11.

♀. 10. vi. 06.

Grant's Francolin was common in some localities and rare in others. They were found chiefly in the bush-country, in pairs or coveys. Their eggs were taken in May.

The sexes differ in colour to a slight extent. The bird shot in April is in very worn plumage, those in March and June are fresh and clean. They are noisy birds, calling freely just before sunset and sunrise, and are especially noisy just before a shower of rain. The call is an oft-repeated "kariach."

Localities. Kariba's Camp, Nile Province, and Kabulamuliro, in Uganda; Embu and Nyeri, in British East Africa.

Francolinus lathami schubotzi.

Francolinus lathami schubotzi Reichenow, J. Ornith. lx. 1912, p. 320: Uelle River, Belgian Congo.

♂ 1-5; imm. 1. 9. ix. 13; 20. ii. 14; 30. v. 14; 26. ii. 14; 9. ix. 13.

♀ 1-5. 20. ii. 14; 20. ii. 14; 20. ix. 13; 14. x. 13; 26. iii. 14.

A rare species, confined to the large dense forests.

Males differ from *F. l. lathamii* (Hartl. 1854) in having the cheeks and upper side of the neck light pearl-grey or pure white; the flank-feathers black with white spots, cordate or circular in shape. In *F. l. lathamii* the cheeks are a dull grey. In *F. l. schubotzi* the abdomen is dirty-white with black cross-bars, in *F. l. lathamii* white washed with brownish and only faintly barred. The spotting on the under surface is smaller and very much finer towards the neck; the spots are large in *F. l. lathamii*. The flanks are brown with white shaft-streaks, in *F. l. lathamii* brown with white spots. In this subspecies the under tail-coverts are black with white shaft-stripes and slight barring, black with white cross-bars in *F. l. lathamii*.

The females differ in much the same way as do the males, but in this subspecies the cheeks and side of the neck are invariably reddish brown, not greyish. The white spotting on the neck and upper breast is confined to narrow shaft-streaks.

Young males differ from adults in having the head mottled, the feathers being tipped with black; the chin and throat white; the sides of the head and ear-coverts brownish, as in females; the feathers of the breast and abdomen brown with white cross-shaped markings outlined in black; the flanks lighter brown with whitish shaft-streaks and faint vermiculations. The upper surface is strong reddish brown heavily marbled in black, the scapular feathers having an ochraceous shaft-stripe.

These birds go in pairs or small coveys, and are very shy and difficult to procure. Breeding-birds were shot in June, and young, of about a month old, obtained in September.

Locality. Mabira Forest, in Uganda.

***Francolinus nahani*.**

Francolinus nahani Dubois, Ann. Mus. Congo, i. 1905, p. 17, pl. x.: Ituri River, Belgian Congo.

1-3. 16.ix.13; 16.ix.13; 16.ix.13.

1. 14.i.14.

Another very rare forest Francolin, hitherto known only

from the type, which is in the Tring Museum. Dubois described and figured this bird in the 'Annals of the Congo Museum.' His specimen is obviously a young bird in the intermediate plumage. It differs from all my birds in the colour of the legs and feet, which are described and figured as being grey. All my birds, and three collected by Sir F. Jackson, have crimson legs. Young birds are similar to adults, except that they are darker on the under side; the spotting of the neck is not so distinct and does not extend on to the back of it.

The adult may be described as having the crown of the head dark brownish black, feathers elongated; posterior half of superciliary stripe black and white. Ear-coverts brownish black or speckled with white; cheeks, sides of throat, and neck whitish, each feather having pear-shaped terminal black spots, giving the whole a mottled appearance. Mantle and scapulars brown with black vermiculations and a black shaft-patch, in the centre of which the shaft is white. Rump and tail-coverts brown with longitudinal and transverse vermiculations; coverts brown with black centres, towards the extremity of the outer web there is a conspicuous buff spot. Secondaries black with irregular, transverse, pale brown markings. Primaries blackish brown with pale brown edgings to the outer web. Crop and breast-feathers black with two longitudinal, white, irregular stripes; lower breast-feathers white with central black streak, and narrow black edging. Flank-feathers black with irregular roundish white spots towards the margins of the webs; some feathers have white shaft-spots. Abdomen greyish black with whitish cross-bars. Under tail-coverts glossy black with a few buff spots on either web. Bare patch round the eyes crimson, base of bill crimson, tip blackish brown. Legs and feet crimson, toes black.

Found in pairs, usually in the company of Guinea-Fowl; it is shy and difficult to procure.

Locality. Mabira Forest, in Uganda.

Coturnix coturnix africana.

♂ . 28. xii. 14.

♀ . 24. iv. 13.

Sometimes plentiful. The male shot in January had very large testes, and was probably breeding.

Localities. Embu, Kyambu, in British East Africa.

Coturnix delagorguei.

♂ 1-2. 7. vii. 12; 22. vi. 12.

♀ 1-3. 7. vii. 12; 7. vii. 12.

Common at certain seasons. Breeds in May, June, and July, and also in December, but the season depends on the rains to a great extent. The males call incessantly when the season is on; the call is a loud piercing "twee twit," repeated five or six times at short intervals. The females make the same sound, but very low, so low as to be almost inaudible. When the breeding-season commences, the males become extremely pugnacious and fight one another; they do some most surprising high jumps when trying to avoid one another. If one bird gets a good grip of his opponent, he jumps about, shakes and worries his foe as a dog worries a rat. I have often watched these battles taking place.

These Quails lay quite large eggs; the colour varies from a sandy to buff or almost whitish cream with very fine to large raised black spots. They breed readily in captivity.

Localities. Jinja and Sio River, in Uganda; Kano, Nairobi, and Kisumu, in British East Africa.

Excalfactoria adansoni.

♂ & ♀ . 17. iv. 10.

The Blue Quail is not plentiful, but is widely distributed in Uganda and British East Africa. Small coveys are sometimes flushed in the grass-country.

Localities. Mpumu and Kyetema, in Uganda.

Circus ranivorus and Circus æruginosus.

One specimen of each was obtained. Not common.

Locality. Kyetema, in Uganda.

Kaupifalco monogrammicus.

♂ 1-3. 24. iv. 10; 7. xii. 14; 13. i. 12.

A common species. The stomach of one specimen contained chameleons, lizards, mice, and a grey sticky liquid.

Localities. Mpumu and Kyetema, in Uganda; Nairobi, in British East Africa.

Astur melanoleucus.

♂ 1-2. 26. vi. 10; 24. vi. 10.

Imm. 20. vi. 10.

Rather uncommon, they are met with in the acacia-country.

Locality. Kyetema, in Uganda.

Astur nyanzæ.

Astur tachiro nyanzæ Neumann, Ornith. Monatsb. xiii. 1902, p. 138: Uganda.

♀. 20. xii. 14.

Not a common species.

Locality. Nairobi, in British East Africa.

Astur tachiro.

♂. 7. vii. 09.

A fair number of these Hawks were seen at different times, but they are not plentiful.

Locality. Kyetema, in Uganda.

Accipiter tropicalis.

♂. 10. iii. 14.

An adult bird in good plumage. The stomach contained beetles and the body of a large skipper-butterfly, which I saw being caught.

Locality. Nairobi, in British East Africa.

Micronisus gaber.

♂ & ♀, & imm. 21. iv. 11; 28. xii. 14.

One male is in the intermediate plumage, the other is in the first or brown stage, the female is an adult.

I have seen this bird swoop at a trunk of a tree and fly off with a tree-lizard in its feet.

Localities. Kalwanga, in Uganda; Nairobi, in British East Africa.

Spizaëtus bellicosus.

♂ & ♀. 7.v.10.

Not very common. They are great chicken-thieves.

Locality. Kyetema, in Uganda.

Hieraëtus wahlbergi.

♀ 1-2. 20.ix.09; 29.viii.09.

This bird is fairly common on the outskirts of forest and in the acacia-country.

Locality. Katai, in Uganda.

Lophoaëtus occipitalis.

♂ & ♀. 12.x.07; 20.vii.12.

Seen frequently in the acacia-country.

A nest was found at the top of a Euphorbia-tree in July. It was a large structure, composed of twigs and reeds, and lined with leaves and bits of grass; fresh green leaves were added from time to time. The eggs were hard-set and were of a dirty creamy-white with red-brown spots and blotches.

Localities. Kyetema, in Uganda; Kisumu and Nairobi, in British East Africa.

Buteo augur.

♂ 1-3. 27.v.10; 27.v.10; 7.ii.11.

A common species. Of the specimens obtained, one adult is in the black and white dress, the other in the pure black; both have red tails, more or less barred. Can these birds be dimorphic, or are they distinct species?

A nest of this species was obtained in September. It was a deep structure, composed of twigs, clumps of grass, and leaves, and lined with fresh green leaves. The clutch consists of two eggs of a creamy ground-colour with large brown spots and blotches.

Localities. Kutunzi and Toro, in Uganda; Kisumu and Nakuru, in British East Africa.

Helotarsus ecaudatus.

♂ & ♀. 9.iv.14.

Not common, but widely distributed.

A nest was found built in a very tall tree; it was very

large and well built of sticks and reeds, and lined with leaves. The egg was pure white with a matt surface, and very large. This nest was repaired and occupied during several seasons. When it was not being used by the Eagles a pair of Eagle-Owls took possession.

The female bird, which was shot off the nest, has the interscapular feathers almost white.

Localities. Kyetema, in Uganda; Elgon and Nairobi, in British East Africa.

Haliaëtus vocifer.

♂ & ♀. 3.x.10; 3.x.10.

A fine pair, procured at Lake George; they are in full clean plumage. A pair of these birds nest in a large Mvule-tree at Jinja; the nest has been used for many succeeding seasons and is now a huge structure. At least two young are reared every year. The eggs of this bird are pure white with a matt surface.

Localities. Lake George and Jinja, in Uganda.

Milvus ægyptius parasitus.

Milvus ægyptius (Gm.); Reichenow, Vög. Afr. i. p. 609.
♀. 7.ix.09.

A common bird. A nest and two eggs were taken in September. The eggs are not very large, and are creamy-white in ground-colour with brown and greyish blotches.

Localities. Kiagwe and Toro districts, in Uganda.

Elanus cæruleus.

♂ & ♀ 1-5. 31.vii.06; 12.xi.14; 22.v.10; 14.xi.14;
5.vi.12.

Common. The stomach of one bird contained five mice and one small lizard.

Localities. Lugalambo, Kyetema, Kikoma, in Uganda; Nakuru and Nairobi, in British East Africa.

Baza verreauxi.

♂ & ♀. 28.iv.14; 3.viii.14.

One specimen has the under surface barred, the other is spotted. Seen on several occasions, but not common.

Locality. Nairobi, in British East Africa.

Falco cuvieri.

♂. 14.v.12.

Not a common species. The specimen obtained is in full clean plumage.

Locality. Kyetema, in Uganda.

Cerchneis tinnunculus.

♂ 1-4. 6.x.12; 26.ii.14; 10.i.12; 10.i.12.

♀ 1-2. 10.xi.14; 29.xii.09.

The male shot in October is in full plumage, while the rest are in the immature and winter dress.

Localities. Kyetema, Mabira, in Uganda; Nakuru and Nairobi, in British East Africa.

Bubo lacteus.

♂. 16.xi.09.

A nest of this species was found in November at Kyetema, and the parent shot off it. The eggs are large, almost spherical, and pure white. These birds were seen in some caves near Nakuru.

Locality. Kyetema, in Uganda.

Bubo maculosus.

♂. 7.xi.10.

Met with occasionally, but not common.

Locality. Toro, in Uganda.

Asio nisuela.

♂. 14.xi.12.

A male was procured from the reed-beds on the shore of Lake Nakuru. A common bird.

Locality. Nakuru, in British East Africa.

Pisorhina scops scops.

♂. 19.i.12.

This specimen was caught in a trap set for small rodents. It is quite distinct from *P. scops ugandæ*.

Locality. Kyetema, in Uganda.

Syrnium woodfordi suahelicum.

♂. 20. iv. 12.

This is a brownish specimen, with large white spots on the back, and is fully adult. I am doubtful whether this subspecies is a good one, but I have insufficient material for comparison. There is no doubt a great variation in plumage.

Locality. Kyetema, in Uganda.

Psittacus erithacus.

♂ 1-2; ♀ 1. 1909.

Common. Many were seen in the forests. They are difficult to obtain, for they fly high and swiftly. They are very noisy, uttering their shrill whistles when on the wing or when perching. Large numbers used to fly from the mainland to the Sesse Islands every morning, and return in the evening.

Localities. Jinja, Kampala, Sesse Islands, Mabira, in Uganda; Mumias, in British East Africa.

Poicephalus gulielmi massaicus.

♂. 15. v. 13.

The Massai Green Parrot was seen in pairs in the forest and the acacia-country. They whistle when on the wing and call loudly, but not often. They were nesting in June.

Localities. Kyambu, Londiani, and Ravine, in British East Africa.

Poicephalus meyeri saturatus.

Poicephalus saturatus Sharpe, Bull. B. O. C. xi. 1901, p. 67: Ankoli, Uganda.

♀. 17. vii. 10.

This is a very dark bird, with a pale bluish-green rump and under surface, tinged with emerald-green. It is in good plumage. These Parrots were seen in fair numbers in the game-country, where they nested in holes or in the thick parasitic plants growing on the tops of the acacias. They are shy birds and difficult to obtain.

Locality. Kikoma, in Uganda.

Poicephalus meyeri nyansæ.

Poicephalus meyeri nyansæ Neumann, Nov. Zool. 1908, p. 383: Unyoro.

♀. 13.ii.10.

I have kept this bird separate, as it is quite different in coloration from the last. It is a smaller and greener bird, but belongs to the dark group.

These birds were fairly plentiful, but were shy and high-flyers.

Locality. Butikiro, in Uganda.

Poicephalus meyeri virescens.

Several were seen in southern Kavirondo and Lumbwa district. They were in small flocks, feeding freely on the native grain-crops.

Localities. Kibos, south to Lumbwa, in British East Africa.

Agapornis pullarius.

♂ 1-4; ♀ 1. 20.vi.06; 27.vi.06; 2.ii.12; 10.ii.12; 10.ii.12.

This species was common in the Western Province.

Localities. Buddu, Toro, Entebbe, Lufumvwe, in Uganda.

Palæornis cubicularis.

♂. 20.iv.11.

This adult male is in fresh plumage. It resembles other specimens of *P. cubicularis* in the yellow-green of the forehead, but lacks the grey on the posterior half of the crown and nape; the cheeks are a bright greenish yellow. The grey-blue collar is very narrow, while the salmon-pink is visible only at the sides of the neck, and is not separated from the black on the side of the throat by any blue line. The bird is altogether brighter than any specimen in the Tring Museum.

Locality. Ibrahim's Camp, Nile Province, Uganda.

Corythæola cristata.

♂ 1-2. 24.i.12; 29.vi.06.

♀ nestling. 20.vii.09.

The Great Blue Plantain-eater was found in the large forests, in pairs or in flocks. They were very noisy. These birds are excellent hoppers, both on trees and on the ground. They build a rough nest of twigs, which resembles that of a Wood-Pigeon's, only much larger. One or two eggs are laid, almost spherical in shape, and white in colour. The young when hatched are covered with a fine, short, black, woolly down. The bill is horn-coloured with pale edges and a prominent white spike on the tip of the upper mandible and a yellowish base. The feet are black. Eggs have been taken in September and nestlings in July.

Localities. Bale, Kyetema, Mabira, in Uganda.

Musophaga rossæ.

♂ 1-3. 20.vi.06; 10.x.06; 10.x.06.

♀. 21.i.12.

The Scarlet-crested Plantain-eater is common in Uganda, but not in British East Africa. They nest in May, and also in October. The nest is constructed of twigs and is merely a shallow platform. The eggs are a pale bluish, and two in number; they are almost spherical.

Young birds in the first plumage are not so blue as adults, as the individual feathers are blackish with a faint dark blue wash.

Localities. Kyetema, Bale, Mpumu, and Mabira, in Uganda.

Chizærhis leucogastra.

♂ 1; ♀ 1-2. 19.vi.06; 19.vi.06; ? 1909.

The Yellow-billed Plantain-eater was seen in fair numbers in the forests. When displaying, the males ruffle out the neck-plumes and raise the crest, giving them a fierce appearance. The nest of this species is like that of the foregoing. The eggs are white and round.

Localities. Kyetema, Bale, in Uganda.

Gymnoschizorhis personata centralis.

Gymnoschizorhis personata centralis Neumann, Bull. B.O.C. xxi. 1908, p. 94: Kitangula, W. of Victoria Nyanza.

♂ 1-3. 15.v.09; ? 1909.

♀ 1-3. 15.v.09; 21.vi.12; ? 1909.

The native name for this bird is "Wora." There appears to be no difference between the birds from Uganda and those from British East Africa. These birds are not confined to the great tree-forests, but are found in the acacia-country. Their flight is undulating, consisting of a series of flaps and then a long glide with a gradual descent; this is followed by a few more flaps and another glide, and so on. When these birds are courting, they distend the throat in much the same way as do Pouter-Pigeons.

I found these birds wonderfully tame and easy to procure.

Localities. Buddu, Bale, Bwera, Nambrizi, in Uganda; Kano, in British East Africa.

Turacus leucolophus.

♂ 1-3. 20.iii.10; 27.iii.14; 10.iv.14.

Not a common species in Uganda, but quite common in certain parts of British East Africa.

Localities. Nakaina, in Uganda; Kakamega Forest, in British East Africa.

Turacus emini.

♂ 1-2. 14.xi.12; 12.i.14.

♀. 10.iii.14.

Quite a common species in certain forests in Uganda. One of the specimens procured has the infraorbital spot brown-black, not green as in other specimens; it also has the base of the lower mandible orange-yellow, and the shading on the neck and wings is bronzy.

Localities. Mabira and Namwave Forests, in Uganda.

Turacus hartlaubi.

♂. 27.xii.14.

These birds are fairly common in the Kikuyu Forest.

Locality. Kikuyu Forest, British East Africa.

Centropus fischeri.

♂ 1-3. 22.iii.11; 16.vi.07.

♀. 10.vi.10.

Fischer's Coucal is not a very common bird. It inhabits the dense reed-beds and swamps. It is skulking in habits

and remarkably indifferent to mankind. They are very destructive to the eggs and young of swamp-birds. Young birds have been collected in March, eggs from March to June and also in September. These birds feed largely on frogs, lizards, and locusts, and eggs and young of small birds.

Reichenow describes the type as having a sandy loreal spot and eye-stripe, but these characters are signs of partial immaturity. Fully adult birds have a blackish-brown upper surface, those with a brown or parti-coloured back are immature or assuming the fully adult plumage. I have examined a large series of these birds. The head and nape of an adult in freshly moulted plumage are a dark blue, which, when worn, becomes almost black. Reichenow's *C. nigrodorsalis*, stated to be a variety or hybrid between *C. fischeri* and *C. occidentalis*, is the fully adult *C. fischeri*.

Localities. Kyetema and Dwimi River, in Uganda.

Centropus monachus.

These birds were found breeding in a swamp in the Nyeri, Embu district, in June, where the nests and eggs were obtained. They resemble those of other Coucals. These birds are lazy and never exert themselves to any extent. I have watched them sitting on the top of some reed-stem, perfectly motionless, for some hours.

Locality. Embu Road, British East Africa.

Centropus superciliosus.

♂ 1-3 ; imm. 1 ; & nestling 1. 21.vi.12 ; 24.v.12 ; 22.vii.06 ; 9.x.10 ; 21.vi.12.

A very common species, found in swamps, on the outskirts of forests, and in the acacia scrub-country. Their call is characteristic and not unpleasant ; Jackson likens it to the sound produced by pouring water slowly from a height into a narrow-necked earthenware jar. Nests and eggs were taken in April and July, and in October and January ; young birds in March, May, and June, and again in October.

Nestlings are covered almost entirely with long quills, each of which is provided with a long cream-coloured hair, three-quarters of an inch in length. The young, when disturbed, make a hissing wheezing noise.

Localities. Toro and Bale, in Uganda; Kano and Nairobi, in British East Africa.

Ceuthmochares aëreus intermedius.

♂ 1-7. 19.xii.11; 7.xi.14; 15.xii.13; 14.x.13; 20.iv.12.

♀ 1-2; nestling 1. 14.xii.13; 7.xi.14.

Several examples of the Yellow-billed Coucal were obtained from the forests in Uganda. In habits they are like other birds of this group. A nestling obtained in November is very like an adult in coloration, but is much darker; the grey of the head and neck being washed with olive-green, and the wings and tail are dark bluish green. The bill is horn-brown, the feet blackish.

Localities. Mubango, Mabira, Kyetema, and Sezibwa River, in Uganda.

Clamator cafer.

♂ 1-3. 15.v.10; 14.i.10; 19.xii.11.

♀ 1-2. 20.iii.10; 30.iii.10.

The Black-crested Cuckoo was met with in the scrub and acacia country, in pairs or in small parties.

Young birds in first plumage were shot in November.

Birds from Uganda, on the whole, are smaller than those from further south. Two specimens have almost uniform black throats.

Localities. Nakaina, Bwera, Kyetema, and Harubale, in Uganda.

Clamator glandarius.

♀ 1-2. 25.vii.12; 18.v.10.

These birds were seen in pairs in the scrub-country. They are noisy creatures.

Localities. Gondokoro, in Uganda; Kano, in British East Africa.

***Cercococcyx mechowii*.**

♂ 1-3. 10.xi.14; 3.xi.13; 5.ix.13.

The adult specimens of Mechow's Long-tailed Cuckoo were obtained in the dense forest. My collector, who procured them, states that they go in pairs or singly, and that they are very timid, making off at once if they see one approaching. It is a rare bird.

Localities. Sezibwa River, Mabira, and Kasala Forest, in Uganda.

***Cuculus mabiræ*.**

Cuculus mabiræ van Someren, Bull. B. O. C. xxxv. 1915, p. 116: Kasala Forest, Uganda.

♂ 1-2. 24.vi.14 (*type of the species*); —.viii.11.

This species is midway between *C. jacksoni* and *C. gabonensis*, specimens of which were obtained. It differs from *C. jacksoni* in not being heavily barred with black on the underside, and in having a much paler chestnut throat and crop. The tail is blue-black, the centre feathers being uniform or with minute white spots on the midrib, the outer feathers with white spots on the midrib and on the inner web. The inner webs of the primaries have large ill-defined white spots. The ear-coverts are light chestnut. Wing measures 179 to 180 mm., tail 173-175 (skin).

This is a forest-bird, keeping to the thick undergrowth and trees. There was one specimen of this bird in the Tring Museum, collected by Hughes in the Mabira Forest.

Localities. Kasala and Mabira Forest, in Uganda.

***Cuculus jacksoni*.**

♂. 19.viii.11.

An adult in almost full plumage. A rare forest-species.

Locality. Mabira Forest, in Uganda.

***Cuculus clamosus*.**

♂ 1-2. 28.xi.14; 30.xii.14.

One specimen is unfortunately damaged. The series in the Tring Museum shows a great variation in plumage, from

an almost uniform black bird to those with barred under surfaces and throats washed with chestnut.

Localities. Nairobi, in British East Africa; Kyetema, in Uganda.

Cuculus solitarius.

♂ 1-4. 26. iv. 10; 26. iv. 10; 20. iii. 10; 27. vii. 09.

♀ 1-2; nestlings 1-2; imm. 1-2. 6. x. 14; 7. xi. 14; 30. vi. 12; 25. vi. 10; 5. v. 14.

This is the commonest Cuckoo in Uganda, next to *C. canorus* (when this latter is on migration). It is a noisy bird, and during the breeding-season becomes a nuisance, because of its incessant call. It inhabits the more open wooded country, plantations, and scrub-lands. We have taken their eggs in February, May, and July, and young in May and June, from the nests of *Moiacilla vidua*, *Pycnonotus micrus*, *P. barbatus minor*, and *Bleda flavigula*.

Localities. Sezibwa River, Mabira, Kyetema, Kivuvu, and Nakaina, in Uganda.

Cuculus canorus.

♂ & ♀. From July to February, 1906-1914.

A common bird on migration, always noisy when just about to migrate north.

Localities. Mabira, Toro, Kabulamuliro, and Kyetema, in Uganda.

Chrysococcyx cupreus.

♂ 1-6. 12. i. 12; 30. viii. 06; 30. viii. 06; 28. iv. 12; 20. vii. 10.

♀ 1-4, & nestling. 23. iii. 09; 30. x. 09; 15. xi. 10; 30. viii. 06.

The Bronze Cuckoo is extremely common. It is usually met with on the outskirts of forests, in plantations, and in the scrub-country. We took its eggs from the nests of *Tchitrea cristata*, *Cisticola cinerascens*, *C. ambigua*, and

C. erythrops. The eggs vary in colour, from pure blue to greenish blue or pinkish, with reddish-brown and greyish spots.

The young of this species is quite different in coloration from that of *C. klaasi*.

Localities. Kyetema, Butambala, and Buddu, in Uganda.

Chrysococcyx klaasi.

♂ 1-4. 4.i.10; 7.xi.14; 14.vii.12; 26.ix.10.

Not so common in Uganda as in British East Africa. We have found the eggs of this Cuckoo in the nests of the following species:—*Tchitrea viridis*, *Camaroptera tincla*, *Cisticola erythrops*. Young birds, when first hatched, are almost black in colour. They have been seen in January, February, May, and July.

Localities. Sezibwa River, Kyetema, Jinja, in Uganda; Kano and Nairobi, in British East Africa.

Metallococcyx smaragdineus.

♂ 1-4. 7.x.14; 20.vi.14; 3.iii.12; 15.x.14.

♀. 7.v.14.

Not very common. They were seen in the more open forests and wood-lands. We have not taken their eggs, but procured young in May.

Localities. Mabira, Kasala, Namwave, and Mubango Forests, in Uganda.

Indicator major.

♂. 28.ix.10.

A male in breeding condition was obtained in September, and an egg of this species from the nest of *Campothera nubica*.

Locality. Mubendi, in Uganda.

Indicator variegatus.

♂ 1-2; nestling ♀ 1. 22.iii.12; 23.ii.11; 23.iii.12.

Fairly common. Eggs were obtained from nests of *Mesopicus centralis* and *Barbatula leucolaima*. A nestling was taken from a nest of *M. centralis* in February.

Localities. Kaina and Butunzi, in Uganda; Kyambu, in British East Africa.

Indicator pygmæus.

♀. 7. v. 14.

A single specimen of this small Honeyguide was procured in the forest. I am not satisfied with its identification; it differs from the description of *I. pygmæus* and also from any of the named species. There is one bird in the British Museum identical with my specimen; this was collected by the Ruwenzori Expedition in western Uganda. This specimen has been referred to *I. exilis*, from which, however, it appears to be quite distinct.

Locality. Mabira Forest, Uganda.

Lybius bidentatus æquatorialis.

♂ 1-3. 5. vi. 06; 16. vii. 10; 5. vi. 06.

♀ 1-2. 19. vi. 06; 29. ix. 10.

The Crimson-breasted Barbet was met with in the forest and scrub. Breeding-birds were collected in June and July. They nest in holes in trees. When these birds are displaying they expand the tuft of white feathers on the flanks and raise those on the rump.

Localities. Kyabalinga, Bale, Kyetema, Kasaka, in Uganda.

Lybius leucocephalus.

♂ 1-3. 10. iv. 11; 14. vii. 12; ? 1909.

♀. 14. vii. 12.

One specimen has the tail partly white, and is probably albinistic. These birds are found in the scrub-country and in old native gardens. They are great fruit-eaters, but also take insects and seeds.

Localities. Sio River, Kyetema, Toro, Tondola, in Uganda.

Lybius ugandæ.

Lybius tridactylus ugandæ Berger, Orn. Monatsb. 1907, p. 201: Nimule, Uganda.

♂ 1. 24. ii. 11.

♀ 1-2. 21. iv. 11; 22. iv. 11.

Not very common. These birds are found in the forests and native plantations.

Localities. Toro, Masindi, in Uganda.

Tricholæma ansorgei.

♂ 1-5. 4.iii.13; 10.v.14; 27.ix.13; 10.xi.13; 25.vii.10.

♀ 1-6. 14.x.13; 10.v.14; 20.vi.10; 21.xi.12; 2.v.14; 6.x.14.

Ansorge's Spotted Barbet was a common bird in the forest, more especially when the wild figs were in fruit.

When the males are courting or calling they expand their crops, so as to make the breast-feathers, with their long fine terminal hairs, stand out like an apron. To do this they raise themselves to their full height by stretching the legs and body and then gradually resume a normal position, at the same time puffing out the feathers.

Female birds are yellower on the under surface, and the spotting on the back is yellow, not green or lemon-colour.

Localities. Jinja, Mabira, Mubango, Kasala, Kyetema, in Uganda.

Tricholæma radcliffei.

Tricholæma radcliffei O.-Grant, Bull. B. O. C. xv. 1904, p. 29: Mulema, Uganda.

♂ & ♀. 15.iii.12; 10.vii.12.

Radcliffe's Barbet was not a common species. It was met with in the acacia-country.

Localities. Sio River, Kabulamuliro, in Uganda.

Tricholæma massaicum.

♂. 10.vii.10.

These Barbets were fairly common in the scrub-country. I noticed that they were very fond of white ants, and sought for them in the earth-tunnels which had been constructed along the stems and branches of trees; they would go systematically along all the branches, ripping the tunnels open in their entire length. They have a loud piping call.

Localities. Kisumu and Escarpment, in British East Africa.

Tricholæma diadematum.

♂ 1-2. 10.vii.12.

Two birds agree well with typical *T. diadematum*, but a

third is very like *T. gallarum*. These birds are found in the open forest and scrub-country, in pairs or singly.

Localities. Sio River and Kyetema, in Uganda.

Gymnobucco cinereiceps.

♂ 1-4. 5.xii.14; 24.ii.14; 13.v.12; 19.xii.14.

♀ 1-5. 3.iii.12; 7.x.14; 28.ii.14; 7.x.14; 3.iii.12.

The Tufted Barbet was fairly common in the forests, where it kept to the thick-foliaged trees. They are especially numerous when the wild-fig season is on. Birds in breeding-condition were shot in March.

None of my birds has the wing over 95 mm.

Localities. Namwave, Mubango, Kyetema, and Mabira Forests, in Uganda.

Buccanodon duchaillui.

♂ 1-8. 3.ii.11; 5.xi.14; 10.v.14; 5.x.14; 8.iii.12; 5.x.10.

♀ 1-3, & imm. 1-2. 10.vi.14; 14.ii.13; 17.i.14; 17.i.17; 10.vii.12.

This series shows great variation in the colour of the mantle from birds with almost no spotting to those with the spotting extending well on to the nape, so I have retained Cassin's name for them all.

Young birds in first plumage were obtained in January and in July, and nests were found in February.

Localities. Mabira, Namwave, Mubango, Mpumu, and Kivuvu Forests, in Uganda; Kisumu, in British East Africa.

Barbatula scolopacea aloysii.

Xylobucco aloysii Salvadori, Boll. Mus. Torino, xxi. no. 542, 1906, p. 2: Uganda.

♂ 1-3. 16.xi.09; 14.x.13; 27.xii.11.

♀ 1-4. 7.v.14; 27.xii.11; 27.xii.11; 27.ix.12.

This small Green Barbet frequents the forest, scrub, and acacia country, and is fairly common in gardens. Nests have been found in May and December. These birds creep along branches in the same manner as Tree-creepers do; they nest in natural or excavated holes in trees.

Localities. Mabira, Kyetema, and Kabamba, in Uganda.

Barbatula nyanzæ.

Barbatula leucolaima nyanzæ Neumann, J. Ornith. 1907, p. 347: Uganda.

♂ & ♀. 30. xii. 11.

The little Yellow-rumped Barbet was found in the old native plantations and gardens. Several pairs were seen feeding in a ficus-tree. They were breeding in May and December.

Locality. Kyetema, in Uganda.

***Barbatula jacksoni.* (Plate V.)**

♂ & ♀. 17. vi. 13; 17. vi. 13.

Jackson's Grey-throated Barbet was a common species in British East Africa, inhabiting the open forests and plantations. It nested regularly in my garden in Nairobi. The nesting-hole was usually excavated in some soft decaying tree-trunk or end of a broken branch. There is little or no lining, merely a few bits of wood-pulp. The eggs are white. I have taken the egg of *Indicator major* from one of these nests.

The birds use these nesting-holes for roosting-places during the off-season. They feed largely on insects and soft fruit.

Localities. Nairobi, Kyambu Escarpment, in British East Africa.

Barbatula subsulphurea.

♂ 1-2. 17. i. 14; 14. viii. 13.

♀ 1-3. 17. i. 14; 17. vi. 13; 7. ii. 14.

These little Barbets are common in the forest, where their loud note can be heard very frequently. They nest in holes in tree-stems and branches; the eggs are white.

The nesting-season is, apparently, May to June, and again in December and January.

Localities. Mabira, Kyetema, and Namwave Forests, in Uganda.



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BARBATULA JACKSONI.

Barbatula centralis centralis.

♂ 1-3. 18.iii.12; 17.xii.12.

This little species is very uncommon, and is found in the forests.

Localities. Nakaina and Businga, in Uganda.

Trachyphonus arnaudi.

♂ & ♀. 22.iv.11.

A pair in good plumage. They were seen in the acacia-country. They are in breeding-condition.

Locality. Toro, in Uganda.

Trachylæmus elgonensis.

♂ 1-5. 9.ix.13; 14.x.13; 17.i.14; 14.i.14; 7.xi.14.

♀ 1-5. 9.ix.13; 7.x.13; 7.x.13; 19.x.13; 19.x.13.

The Yellow-billed Crimson-headed Barbet was fairly plentiful in the forests. Three females shot in September are in very worn plumage, and are probably sitting-birds. The ovaries were large. One male has two large white spots on the uppermost secondaries; it is in moult about the head.

Localities. Mubango, Mabira, Nazigo, and Bugoma Forests, in Uganda.

Dendromus caroli.

♀. 20.x.13.

A female in good plumage of this West African species was shot in the forest. It is an adult, and was the only one seen.

Locality. Bugoma Forest, in Uganda.

Dendromus herberti.

Dendromus herberti Alexander, Bull. B. O. C. xxi. 1908, p. 89: Ubanghi River, Belgian Congo.

♀ 1-2. 12.iv.14; 20.v.14.

Two specimens in good plumage of this rare Woodpecker were obtained in the dense forest. I believe the adult male is still unknown!

Locality. Mabira Forest, in Uganda.

Dendromus nubicus.

♂ 1-2. 18. vi. 06; 17. xi. 13.

♀ 1-3. 15. v. 12; 18. iii. 12; 31. xii. 12.

These birds were fairly common in the acacia-country and forest. They are noisy and shy, though very inquisitive birds. Nests and eggs were obtained in June and July, and young in November.

Localities. Lawala and Kabulamuliro, in Uganda; Kisumu and Londiani, in British East Africa.

Mesopicus goertæ centralis.

♂ & ♀ . . 17. v. 10; 20. vii. 06.

These birds were found breeding in May, June, and July, when eggs and young were obtained. In one nest there was an egg of a Honey-guide. The eggs are white.

Localities. Mawakota, Kikoma, in Uganda.

Mesopicus xantholophus.

♀ . 15. v. 14.

This western species was collected in Uganda proper in the forest. It was the only specimen seen.

Locality. Kasala Forest, in Uganda.

Dendropicus lafresnayeï.

♂ & ♀ , and imm. 19. ii. 12; 15. iii. 12; 9. i. 12.

This little Red-naped Woodpecker was found in the more open forest and acacia country. It was not common.

A young bird just from the nest was shot in February, and another taken in June. Birds in this stage are very difficult to distinguish from young *D. pæcilolæmus*.

Localities. Kyetema and Kabulamuliro, in Uganda.

Dendropicus pæcilolæmus.

♂ & ♀ , and imm. 20. vii. 09; 19. ii. 14; 19. ii. 14.

Found in the open forests and plantations. This species is frequently mistaken for the preceding, but can be at once distinguished by its almost uniform under surface.

Birds were nesting in a hollow tree in March. Young were obtained in February. Here, also, the young can only be distinguished from young *D. lafresnayeï* by the

longer bill and the absence of any coarse spotting on the underside; the upper surfaces are alike. In young males the nape is a deep brownish black, with a few red feathers forming a triangular spot on the hind part of the crown.

Localities. Kabamba and Kyetema, in Uganda.

Colius leucotis affinis.

♂ 1-5. 28.v.06; 14.viii.06; 8.ii.10; 30.i.12; 16.viii.06.

♀. 3.i.12, and nestlings.

These birds are common. They apparently nest during every month of the year. Their nests are constructed of twigs and rootlets and fibre, and lined with fine fibre and leaves of the wild asparagus; this inner lining is renewed from time to time, so that the inside and the rim are always green. The eggs are white, with a matt surface.

Young nestlings are curious-looking creatures, flesh-pink in colour, with greenish bills, bluish skin over the eyes, reddish feet, and orange-coloured mouths.

In naming these birds I went over the whole series. I think too many subspecies have been recognised.

Localities. Mahokya, Bale, Kyetema, and Jinja, in Uganda.

Apaloderma narina.

♂ 1-5. 28.ii.12; 10.iii.13; 9.iv.12; 10.iii.14; 27.ix.13.

This bird is found in the forests and in the heavily-timbered acacia-country. The intensity of the red under-surface varies in individuals from a deep crimson to a pale pinkish, with white under tail-coverts.

A bird moulting from first to second plumage was shot in March.

Localities. Namwave and Mabira Forests, in Uganda.

Coracias caudatus.

♂ 1-2. 15.iii.10; 21.vii.12.

♀. 21.vii.12.

The Long-tailed Roller is common. Birds were found

breeding in March and June. Young birds were taken in October.

These Rollers have a peculiar odour, very like curry-powder. They feed largely on locusts, grasshoppers, butterflies, and other insects, and I have seen them catch and eat small finches and lizards.

Localities. Butikiro, in Uganda; Kano and Embu, in British East Africa.

Eurystomus afer.

♂ & ♀. 2. vii. 09.

These birds are typical *E. afer*, having intensely violet-blue cheeks and ear-coverts. Occasionally seen in pairs.

Locality. Nabugabo, in Uganda.

Eurystomus afer rufobuccalis.

♂ 1-3. 5. xi. 09; 8. iii. 12; 17. iv. 11.

Breeding birds were shot in March, and eggs taken from their nesting-hole in a decaying tree. In these birds the purple is confined to the throat and under-surface, and does not extend on to the cheeks.

Locality. Kabulamuliro, Toro, and Kagera, in Uganda.

Eurystomus gularis neglectus.

Eurystomus gularis neglectus Neumann, Orn. Monatsb. xvi. 1908, p. 28: Angola.

♂ & ♀. 10. iii. 14.

A fine pair of these western birds in full fresh plumage was obtained on the outskirts of the forest. They agree perfectly with birds from the typical locality. The upper tail-coverts are blue and the central tail-feathers dark blue.

Locality. Mabira Forest, in Uganda.

Bucorvus cafer.

A small flock was seen by the Ravine road in a forest-clearing; one was obtained, but it was not injured badly, so was kept alive and is doing well in confinement.

Locality. Ravine, in British East Africa.

Bycanistes subquadratus.

Bycanistes subcylindricus (Scl.) ; Reichenow, Vög. Afr. ii. p. 241 [part.].

♂. 30. v. 10.

A fully adult male. Many of these birds were seen in the larger forests in Uganda. They are noisy and heavy flyers.

The harsh call of this species is one of the commonest sounds in the great forests. We have seen their nesting-holes on several occasions, but have not taken the eggs.

Localities. Mabira and Kyetema Forests, Uganda.

Lophoceros fasciatus.

♂. ?. vii. 09.

This is a young bird in the brown stage ; a few black feathers are appearing on the mantle. Fairly common.

Locality. Kyetema, in Uganda.

Lophoceros melanoleucus suahelicus.

Lophoceros melanoleucus suahelicus Neumann, J. Ornith. 1905, p. 187: Morogoro, German E. Africa.

♂ & ♀. 22. xii. 11 ; 17. xii. 13.

These birds are usually found in the forests, but are occasionally seen in the acacia-country.

Localities. Kyetema, in Uganda ; Ravine, in British East Africa.

Lophoceros nasutus.

♂ 1-2. 19. viii. 10 ; 20. vii. 09.

♀. 7. v. 10.

An adult male and two young birds. These birds are excellent acrobats : I have watched them do some surprising twists while endeavouring to obtain fruit from the end of a slender branch. We saw these birds in couples during the off-season. They have a peculiar whining note, which is uttered in an upright position.

Localities. Kyetema and Nambrizi Plains, in Uganda.

Halcyon chelicuti.

♂ 1-4. 1. v. 12 ; 23. vi. 06 ; 19. ii. 09 ; 22. x. 10.

This is a common species, and is found in the dry acacia-country. It feeds largely on grasshoppers and beetles, and is frequently seen in the neighbourhood of cattle. It nests in holes in trees. Nests were found in June and July, also in January and February.

Localities. Buziranjuvo, Sesse Islands, Kyetema, and Buddu, in Uganda.

***Halcyon leucocephalus.* (Plate VI.)**

Halcyon semicæruleus (Forsk.) ; Reichenow, Vög. Afr. ii. p. 276.

♂. 20. vi. 12.

Imm. 1-2. 10. vi. 12 ; 20. vi. 12.

♀ 1-2. 22. vi. 12 ; 20. vii. 12.

The Brown-bellied Kingfisher was found most frequently at great distances from water. One pair, which had their nest in a bank close to the lake-shore, fed entirely on grasshoppers, which they captured in the vicinity of the nest or farther inland.

A pair frequently came to my garden at Nairobi, also at Nakuru. All the nests that I have found have been in banks of earth, none in holes in trees. The eggs are pure white with a glossy surface. Young nestlings in the quill and feather stage are very dark brownish grey on the crown ; the nape is sandy, and the back and wing-coverts, as far as grown, are dull black. The tips of the secondaries and primaries, which are showing, are deep blue. The rump and tail are a dirty blue ; the chin is white ; the throat, and the rest of the under-surface, is sandy, inclining to pale brown on the flanks and under tail-coverts ; these surfaces, with the exception of the under tail-coverts, are lightly barred with black. A young bird, a fortnight older and just out of the nest, has the head paler grey with a slight brownish wash ; the forehead and lores sandy ; the ear-coverts and cheeks sandy barred with black ; the mantle and wing-coverts dull black, and the blue of the primaries,



MENPES PRESS, WATFORD.

HALCYON LEUCOCEPHALUS.

secondaries, rump, and tail brighter blue. The chin and throat are pure white; the crop-band, breast, and abdomen pale sandy, the two former barred with black; the flanks and under tail-coverts pale brown. The beaks of both birds are dark horny-brown with yellow tips.

Localities. Mabira and Sio River, in Uganda; Kisumu, Nairobi, and Nakuru, in British East Africa.

Halcyon torquatus malimbicus.

♂. 20. vii. 06.

This is a fine male in fresh plumage. Many were seen in the forest-clearings, but it is not a very common bird.

Localities. Bale and Mabira, in Uganda.

Halcyon senegalensis.

♂ & ♀. 22. x. 10; 1. vii. 06.

These birds were found by the side of water and also in the forests. Young birds were seen in March, and nests and eggs in May and July.

Localities. Mawakota, Bukurungu, Bale, in Uganda.

Ispidina picta.

♂ 1-2. 18. vii. 06; 23. vi. 06.

♀. 2. vi. 12.

This little Kingfisher was met with by the side of water and also in the dry scrub-country. The food consists principally of insects. One specimen obtained has dark blue cheeks, and is an adult bird. Eggs were taken from a nest in a bank in August.

Localities. Sesse Isles and Jinja in Uganda; Kisumu and Kano, in British East Africa.

Myioceyx ruficeps.

♀. 7. ii. 14.

One specimen of this rare West African Kingfisher was shot in the forest. It was in breeding condition.

Reichenow gives the distribution as West Africa, Fanti, Aguapim, and Jaunde.

Localities. Mabira Forest, Kiagwe Province, Uganda.

Corythornis cyanostigma.

♂ 1; ♀ 1. 25.xi.10; 15.xi.10.

Imm. ♂ 1. 31.vii.07.

The nests and eggs of this species have been taken by us in June and July, and nestlings in July and December. I obtained a fine series of photographs at one of these nests.

These birds live on a mixed diet, consisting of fish, frogs, lizards, spiders, dragon-flies, mantis, and grasshoppers. They are usually found by the side of lakes and streams.

Localities. Rusinga Channel, Sesse Isles, in Uganda; Kyambu and Nairobi, in British East Africa.

Ceryle maxima.

♂. 26.vi.06.

The Great Spotted Kingfisher was met with on a few occasions along the lake-side and on the larger rivers.

Locality. Kegeru, in Uganda.

Ceryle rudis.

♂ 1-2. 10.ii.11; 17.vi.09.

♀. 10.xi.10.

A common species on lakes, rivers, and swamps. They were found nesting in August, September, November, and December, and again in June. Young birds are like adults in colour, but have the feathers of the throat and under surface edged with black.

Fuller notes on this species appear in our work, 'Bird-Life in Uganda.'

Localities. Buddu, Lake George, Lwala, and Victoria Nyanza, in Uganda; the "Ngong Ditch," in British East Africa.

Melittophagus oreobates.

♂. 14.xii.12.

A very common species in British East Africa. We found it breeding in a sand-pit in December, February, and July. They are noisy birds when hawking for insects, and just when going to roost. They are local migrants.

Large numbers frequent the tall trees in my garden at certain times of the year.

Locality. Ravine, in British East Africa.

Melittophagus lafresnayei.

Large numbers of Bee-eaters, which I took to be this species, were seen in the game-country north-east of Embu, in the Guaso Nyiro district of British East Africa.

Melittophagus variegatus.

♂ & ♀. 15. xi. 09; 13. xii. 09.

This species is not very common in Uganda. It was met with in small flocks on the outskirts of forests.

Localities. Mabira, Mpumu, and Kyetema, in Uganda.

Melittophagus meridionalis.

♂ 1-4. 20. vi. 12; 7. vi. 12; 14. vii. 06; 3. ii. 09.

♀. 15. vi. 12; 18. x. 14 (abnormal).

This is the commonest of the small Bee-eaters in Uganda and British East Africa. It frequents the scrub-country and outskirts of forests. One specimen, obtained on the Wabegengi River, is not typical, but appears to be midway between *M. oreobates* and *M. cyanostictus*, having the dark reddish under surface of the former, with the rest of the plumage like the latter; it, however, is very much bigger than *M. cyanostictus*.

Localities. Kyetema, Jinja, in Uganda; Kisumu, in British East Africa.

Melittophagus bullockoides.

♂ & ♀. 4. iii. 12.

This Bee-eater was plentiful at Nakuru at certain times. They were breeding there in October. There were over a dozen nests in a bank of a railway-cutting.

Localities. Nakuru and Njoro, in British East Africa.

Aerops albicollis.

♂ 1-4. 14. vi. 10; 13. ii. 09; 7. xi. 14; 20. xi. 14.

♀. 14. vi. 10.

A common species in Uganda and British East Africa.

They are noisy birds, especially when going to roost. Eggs were procured in June, from nests in a bank, and one clutch from a nest under an overhanging rock on the side of the bank.

Young birds in first dress were shot in June.

Localities. Sezibwa River, Mpumu, and Kyetema, in Uganda; Kano, in British East Africa.

Merops persicus.

♂ & ♀. 25. iv. 11; 9. x. 11.

These birds were seen in flocks on the Toro Crater Lakes. They were also met with in the Nile Province. They perched on the reeds by the water-side and roosted in these reed-beds at night.

Specimens collected in October are worn.

Localities. Fort Portal and Gondokoro, in Uganda.

Merops superciliosus.

♂. 3. ix. 10.

♀ 1-3. 24. vi. 12; 21. vi. 06; 24. vi. 06.

These birds were seen in fair numbers in Uganda and in British East Africa. They frequented the scrub and acacia country, and were in flocks or in pairs. In the Kano district they were breeding in May and June.

Localities. Gwamba, Kyetema, Mpumu, in Uganda; Kano, in British East Africa.

Merops nubicus.

♂ 1-3; ♀ 1-3. 24. iv. 11; 3. ii. 09.

All these specimens of the Rosy Bee-cater are in worn condition, no doubt as the result of the breeding-season, for there were many young birds in first plumage in the flocks. Some of the adults were moulting.

Locality. Gondokoro, in Uganda.

Upupa senegalensis.

♂ 1-2. 7. x. 14; 12. vii. 10.

These birds have no white between the black and rufous of the crest, and the primaries are banded with white.

Localities. Kyetema, in Uganda; Nakuru, in British East Africa.

Upupa africana.

♂ & ♀, and imm.; ♂ 1. 15. v. 07; 12. x. 14; 12. x. 14.

This species has a wide distribution (*vide* C. Grant, 'Ibis,' 1915, p. 279). They frequent the scrub and acacia country, and are timid. A pair with young in first plumage frequented my garden in Nairobi in October. They fed largely on white ants.

Localities. Kyetema, in Uganda; Embu, Nakuru, and Nairobi, in British East Africa.

Irrisor erythrorhynchus marwitzi.

Irrisor erythrorhynchus marwitzi Reichenow, Orn. Monatsb. 1906, p. 171: Wembere Steppes, German East Africa.

♂ 1-2; ♀ 1. 15. iii. 12; 15. iii. 12; 18. iii. 10.

This species was frequently met with in the acacia-country. They were seen in pairs or small flocks. There is a great difference in the length of the bills of the males and females.

In connection with Claude Grant's new subspecies, *I. e. ruwenzoræ* ('Ibis,' 1915, p. 286), it is interesting to note that in one of my specimens from Kabulamuliro, Uganda, the third outer tail-feather on one side is unspotted, and on the other side there is a single very small spot. In the other two specimens these feathers have one small white spot each.

Localities. Kabulamuliro, in Uganda; Elmenteita, in British East Africa.

Irrisor bollei jacksoni.

♂. 14. xi. 13.

Jackson's Wood-Hoopoe was occasionally met with in the forests, but it was not common. The specimen procured is moulting.

Locality. Mabira Forest, in Uganda.

Scoptelus pallidiceps.

Scoptelus pallidiceps van Someren, Bull. B. O. C. xxxv. 1915, p. 116: Kasala Forest, Uganda.

♂ 1-4. 14. v. 14 (*type of the species*); 22. vi. 14; 14. v. 14; 16. xii. 13.

♀ 1-4. 9. v. 14; 10. iii. 12; 14. v. 14; 9. x. 13.

Since describing this bird at the British Ornithologists' Club, I have received two other specimens, a male and a female. These birds differ from the female *S. brunneiceps*, with which they are likely to be confused, by being larger, very much greener on the underside, and by having the head very much paler whitish brown, the brownish colour extending well beyond the nape on the upper surface and on to the upper breast on the lower surface.

Immature birds are most likely to be confused, for they have the head much darker brown, and the bill the same length as in *S. brunneiceps*. My specimens in this stage are moulting on the head, and the sprouting feathers are very light whitish brown. Males have the wings 100-105 mm., females 95-99.

This bird was found in the forest, frequenting the tall trees.

Localities. Mabira and Kasala Forests, Uganda; Sio River, Mumias district, Uganda border.

Rhinopomastus cyanomelas schalowi.

♂ 1-3. 10. vi. 13; 27. vii. 11; 30. xii. 10.

♀ 1-2. 10. vi. 13; 4. i. 11.

This species frequents the open forests and the acacia-country, and is seen in pairs or small flocks. They creep along the branches and assume all sorts of curious positions when attempting to catch some elusive insect. They are able to descend a tree-trunk head downwards.

Young birds were procured in June.

Localities. Fort Portal, Mohokya, and Kabaleka, in Uganda; Embu and Kavirondo, in British East Africa.

Caprimulgus frænatus.

♂. 17. xii. 13.

This rather uncommon species was met with in the stony and hilly region round Nakuru. They were frequently seen and heard just at dusk in my garden.

Locality. Nakuru, in British East Africa.

Caprimulgus fossei.

♂ & ♀, and two nestlings. 17.viii.06; 4.iv.11.

This bird is fairly common, and is a resident breeding-species. Nests have been found in the more open forests and in the scrub. The eggs are laid amongst the leaves or stones, according to situation, and are of a dirty pinky white with pale reddish-brown and greyish-purple under-markings, giving the whole a marbled appearance. Eggs were taken in March, April, and June, and young in April. Young in this stage are brown with numerous fine blackish cross-bars. In an older stage the young are paler in colour, the crown still retains the barring, but, in addition, has some blackish feathers, forming a line down its centre; the scapular feathers have dark centres, while the secondaries are black with brown bars and vermiculations; the under surface is pale sandy, slightly more brownish over the crop, and faintly barred.

Localities. Kyetema and Jinja, in Uganda.

Caprimulgus natalensis.

♂ 1-2. 4.ii.10; 1.i.10.

♀ 1. 25.vii.09.

A common species. Eggs were taken in June and August. These birds select a more open spot on which to lay their eggs than do the preceding species. We have found them on a shelving sandy bank by the lake-side, and on the sandy bottom of a dried-up river-bed. They are sometimes quite exposed, but more often they are sheltered by a tuft of grass.

These birds do not differ in any way from typical *C. natalensis*, from South Africa.

Localities. Kyetema, Mpumu, and Kabamba, in Uganda.

Apus shelleyi.

♂ & ♀, and imm. 1. 20.xi.13.

Shelley's Swift was seen in fair numbers flying over the scrub in the Naivasha district.

Localities. Naivasha and Nakuru, in British East Africa.

Apus streubeli.

♂ 1-2. 25.v.12.

♀. 25.v.12.

The White-rumped Swift is fairly common in Uganda and British East Africa. I have found them nesting in caves. Two of these specimens were caught on their nests. The clutches consisted of two and three eggs respectively. The eggs are white.

Localities. Kyetema and Jinja, in Uganda; Nairobi, in British East Africa.

[To be continued.]

X.—*A Note on the Emperor Goose (Philacte canagica) and on the Australian Teal (Nettion castaneum).* By F. E. BLAAUW, M.B.O.U.

In previous papers I have been able to give accounts of the breeding of different species of Geese, and I am glad to say that I am able to add one rare species to the list.

Two or three years ago I got a pair of Emperor Geese (*Philacte canagica*) from North America, and a few months later two pairs more.

The first year following their arrival the birds did not lay, but in the spring of 1914 one pair laid six eggs under a bush. The eggs were put under a common hen, and only one chick hatched, which came to maturity and is still alive and well.

In the spring of 1915 the same pair of birds laid again—a clutch of five eggs this time, which I left to the birds to take care of. The nest was made at a good distance from the water, and was a rather well-constructed nest for a Goose to make.

The eggs, when fresh, were yellowish white and of an elongated shape. During incubation the male bird was in constant attendance, and never left the female.

Incubation lasted twenty-four days, being three days

longer than the time of incubation of *Chen rossi*. All the five eggs hatched, but one of the chicks had a misformed leg and did not live long.

The chick in down is of a beautiful pearl-grey, darkest on the head and upperside and lighter below. The legs and bill are black.

The chicks grew very fast, and in a few weeks were completely feathered. In the first feather-dress the bird resembles the adults, but the grey is not so bluish. The black markings on the feathers are only indicated, and the coverts on the upperside are not so square, but more pointed. The black throat is wanting, and so is the white head and neck—these parts being grey like the rest of the body. The tail is white.

The bill is dusky bluish, flesh-colour at the base and black at the tip. The legs are yellowish black. As soon as the birds are full-grown they begin to moult, shedding all the feathers except the large flight-feathers. The tail-feathers are also moulted.

At the end of October the young birds are quite grown, and similar to the old birds. By this time the upper mandible has got the beautiful blue and flesh colours of the old birds, whilst the lower mandible has become black. The legs are now orange. When the bird is moulting, the first white feathers of the head to appear are near the base of the bill.

Mr. Mathews, in his splendid book on the 'Birds of Australia,' vol. iv. pp. 98 & 113, is of opinion that the two sexes of *Nettion castaneum* are *alike* in plumage, both sexes having the male plumage. I have bred these birds for several years, and I am sorry that I cannot confirm this statement.

The male is of a chestnut colour, with a beautiful bronze and green head and a white spot on each side of the tail.

The female answers the description given by Count Salvadori in the 'Catalogue of Birds in the British Museum,' vol. xxvii. p. 31. *Young* birds in first plumage resemble

the female, but the black marks in the feathers of the breast are absent.

The males begin to get the plumage of the adult when about five or six months old, in such a way that, for instance, birds bred in May are indistinguishable from the old birds in January. In the young males the first change is that the throat becomes black.

The females also acquire the spots on the underside at the same period.

Although the males have not exactly an eclipse plumage, they yet go back in colour a good deal after the breeding-season, and, for a while, the bright colours are clouded over—even the white spots are less bright.

I have a flock of fifteen birds, and have bred them during three or four years, with the result as described above.

XI.—*Bird-parasites and Bird-phylogeny* *.

By LAUNCELOT HARRISON, B.Sc.

(Text-figure 5.)

I HAVE always had the intention of, sooner or later, bringing under the notice of ornithologists the trend of my work upon bird-parasites, and I am very sensible of the privilege which is mine in being asked to address the Club this evening. All field-ornithologists are very well aware of the existence of the Mallophaga, or Biting Lice, of which by far the greater number are distributed upon birds, although they are also found upon nearly all families of mammals. But few, I think, realise how innumerable are the species of these bird-parasites, and what a field they open up for the study of a fascinating side-light on ornithology. It is to this side-light, this oblique illumination of ornithology, that I wish to direct your attention.

* An address, opening a discussion on this subject, delivered to the British Ornithologists' Club on January 12, 1916.

I do not wish to thrust any wearisome entomological details upon you, but, for the purposes of the thesis which I propose to develop, I must outline a very few facts—first, as to the relations and, secondly, as to the biology of these insects.

The Mallophaga are an order of minute insects, ranging in length from one to, in a few exceptional cases, upwards of ten millimetres, the average being about two millimetres. They find their nearest relatives, among free-living insects, in the Psocids, or Book Lice; while they are still more intimately related to another parasitic group, the Anoplura, or Sucking Lice. They are divisible into two suborders: a more primitive one in which the antennæ are hidden beneath the head, and in which the tarsi carry two functional claws; and a more specialised one, in which the antennæ project freely laterally, and which has but one functional claw upon the tarsus. These suborders are, respectively, the Amblycera and the Ischnocera.

The Mallophaga are completely parasitic in all stages of their life-history. Eggs are laid upon the feathers of the host; this gives rise to a larva, generally similar to the adult, and which passes by successive moults through two later larval stages to the adult condition. The insects feed upon feather-barbules and epidermal detritus, and are incapable of maintaining life for more than a couple of days off the body of the host. The Amblycera, the more active suborder, usually leave the host upon its death; and, as it is only under very exceptional cases that they can find a new host, perish altogether. The Ischnocera fix themselves by their mandibles to the feathers of the host, and die *in situ*. Transference from host to host can, then, only take place during actual contact, either at mating, or from brooding mother to young, or, in the case of gregarious birds, when roosting together, or on rare occasions of accidental contact.

Owing to the fact that these insects have lived for a very long time under very equable conditions, on a nutriment of

epidermal products which varies little in chemical composition, at a body temperature which remains practically uniform, and without any complication of the nature of a struggle for existence, they exhibit a condition that I have elsewhere referred to as "retarded evolution." They have not evolved as fast as their hosts. The Pigeons of the world include a very varied assemblage of birds, ranging from large, almost flightless, forms, such as *Goura*, to tiny Doves such as *Stictopelia*. They are parasitized by species of Mallophaga belonging to five genera, two of Amblycera and three of Ischnocera. In connection with one of the latter, *Lipeurus*, we have the remarkable phenomenon of *L. columbae*, passing for the present as a single species, occurring on practically all the Pigeons of the world; while the remaining genera from Pigeons, though they have produced a considerable number of species, nevertheless present a very distinct facies which enables us to detect them as Pigeon-parasites, even when taken straggling upon other hosts. The same thing holds true for any other group of birds. Parasites of Crows, of Kingfishers, of Hawks, of Plovers, of Petrels, are recognisable as such, whether their host origin be known or not.

This condition can have only one reasonable explanation. Just as everyone in this room is convinced that each of the larger groups of birds has been derived from one common ancestral stock, so we must believe, if we examine the evidence in more detail than I am able to submit to you to-night, that the parasites of these groups have also evolved from the parasites of the ancestral stock. And the point I wish to impress upon you is, that they have evolved at a slower rate.

This statement implies that the Mallophaga took to a parasitic mode of life at a very early period, and I wish to suggest to you the grounds upon which I base my opinion. Upon the marsupial fauna isolated in the Austro-Malayan region occurs a family of Amblycera, of primitive two-clawed parasites, which is very closely related to the lowest and most generalised bird-infesting genera. No member of the

higher suborder occurs upon marsupials. But the parasites of the higher mammals belong, with the exception of a couple of species found upon rodents in South America, to a family of Ischnocera, to the more specialised suborder. I suggest, in explanation of these facts, that Amblyceran Mallophaga parasitized birds and marsupials before the higher mammals had differentiated out, and that the parasitic history of the group dates from late Jurassic or Cretaceous times. No Mallophaga have yet been taken from American marsupials, but I am confident that they will be, and I am equally confident that they will prove to be very closely related to the Boopidæ of Australian marsupials. I do not ask at present any acceptance for my very speculative statement, but I believe that it will be justified when descriptions of forms from American marsupials are available. For my present purpose, I am content to come to much more recent times, and to something upon which I can offer you more substantial evidence. The Ostriches and the Rheas are separated upon two different continents. They possess Ischnoceran parasites—that is to say, parasites of the higher suborder,—which are distinguished from all other Mallophaga by a peculiar asymmetry of the chitinous framework of the head, an asymmetry that can be of no use to the insects. It is very certain that these parasites have had common origin, a fact which not only affords additional evidence of the common origin of the host groups, but which also allows us to set the acquisition of the parasitic habit by the Mallophaga sufficiently far back for all practical purposes. The more specialised suborder was leading a parasitic life at such time as the original Struthious stock became split in two, and the two halves isolated in the Ethiopian and Neotropical regions.

I wish to touch upon just one more point before I proceed to apply the statements I have already made. I have shown that the general condition of Mallophagan distribution cannot be zoo-geographical, but is, rather, a distribution according to host. Birds of any family, whether at the pole

or the equator, in the Old World or New, carry the same types of parasite. I have shown that opportunities of invading a new host are limited. The final question I wish to discuss is: Whether it is possible for parasites to reach and thrive upon hosts not of their proper group, and so to vitiate any general theory based upon their distribution? I admit freely that they can invade, and have invaded, other than their true hosts, and I admit that they can thrive upon these new hosts. Bird-parasites have been found living upon mammals, marsupial parasites on carnivores; a species of the Petrel type, undoubtedly originally parasitic upon Petrels, has become established as a normal parasite of Skuas; *Goniocotes gigas*, a parasite of the genus *Numida*, will be found on domestic Fowls almost anywhere. But I submit that these cases are few, and are almost always capable of detection.

I have now put before you the main points to which I wish to direct your attention, and I will briefly recapitulate them. The Mallophaga are a group of insects with a long-standing history of parasitism, which, from their biological conditions, have tended to be handed down from parent to offspring in such a manner as to be associated always with definite host groups, and which have evolved at a much slower rate than their hosts. These facts made it quite evident to me, when I began some six years ago to work at Mallophaga, that the group should be useful in connection with the very vexed question of bird-phylogeny.

I am sure that, even in a gathering of ornithologists, I may say that very little is known about the inter-relations of the bird orders. We can easily divide birds up into a number of perfectly natural groups, but I think that few in this room would care to answer the question as to whether a Crow, say, was more nearly related to a Hawk or to a Duck. Ordinary morphological and embryological methods have broken down badly as far as birds are concerned, and the fossil record is woefully inadequate. This is my excuse, if excuse be required, not for attempting to classify birds

by their parasites, for I know that that would be absurd, but for putting forward the clues as to affinity which these parasites seem to afford. Such clues may, at all events, help the morphologist to attack his problem in a new light, and to separate those characters of phyletic value from the rest.

I cannot at present, even if the brief time at my disposal allowed, put before you a great deal in the way of positive results of this line of investigation. The Mallophaga themselves have to be more thoroughly collected, examined, and understood before a complete statement can be attempted. But I will just mention a few suggestions I have already published, and finish by giving you a preliminary result of an actual attempt to indicate a natural classification of the Tubinares by means of some of their parasites.

I have already shown elsewhere that Tinamous, Fowls, and Pigeons possess in common Mallophaga of the very distinct family Gonioididæ, and are not infested by the family Philopteridæ. These birds are very generally admitted to be closely related, and parasitic evidence supports this view. *Opisthocomus* also possesses a Gonioidid parasite, which helps to confirm its suggested Gallinaceous affinities. But the same conditions, presence of Gonioididæ and absence of Philopteridæ, obtain with the Penguins. No one has ever suggested any affinity between the Penguins and the Galliform complex, but the evidence afforded by the parasites would seem to demand such affinity.

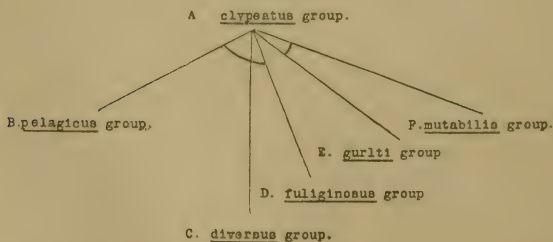
I have shown that the Mallophagan parasites of the Palamedeidæ link up with those of Ducks, Geese, and Swans, thus confirming the Anserine affinities of this somewhat anomalous group. I have suggested, upon the same basis, that the Rails form a very distinct group, of at least ordinal rank; that the Parridæ are Rails, not Limicolines; and, finally, that the Apterygidæ are more nearly akin to the Ralli than to any other living birds, and have nothing in common with the other Ratitæ. Of the latter, the Ostriches and Rheas would seem to have certainly originated from a common ancestral stock, from which I believe the

Emeus also to have been derived, though the evidence here is not quite so convincing.

So much for the few suggestions I have already put forward in print. As I have said already, much more will have to be known about the Mallophaga themselves before any general results can be adduced. But the following attempt will serve to illustrate both my ideas and their possibilities.

The genus *Lipeurus* contains a great number of species found upon nearly all bird families. The *Lipeuri* of Petrels exhibit a very distinct facies, with the details of which I need not trouble you, but which renders them easily recognisable at a glance as Petrel parasites. They fall into six well-marked groups, which may easily be distinguished by the structure of the head. These six groups I name after the best-known species in each of them, the *clypeatus*, *pelagicus*, *diversus*, *fuliginosus*, *gurlti*, and *mutabilis* groups, but, for our present purpose, it will suffice to distinguish them by the first six letters of the alphabet. The precise inter-relation of these groups is not quite certain. I express it tentatively in the diagram.

Text-figure 5.



The main things that stand out are the distinctness of groups E and F from the remaining four, though they show indications of derivation from the *clypeatus* (A) type. Group A is also distinct; groups B and C fairly close

together, while group C shows a remarkable parallelism with group D.

If I now group under the six headings indicated the genera of Petrels from which I have parasites, the following lists result:—

A.	B.	C.
<i>Garrodia.</i>	<i>Procellaria.</i>	<i>Æstrelata.</i>
<i>Oceanites.</i>	<i>Pelagodroma.</i>	<i>Puffinus.</i>
<i>Oceanodroma.</i>		<i>Priofinus.</i>
	<i>Pelecanoides.</i>	<i>Majaqueus.</i>
D.	E.	F.
<i>Æstrelata.</i>	<i>Fulmarus.</i>	<i>Fulmarus.</i>
<i>Puffinus.</i>	<i>Thalassæca.</i>	<i>Priocella.</i>
<i>Priofinus.</i>	<i>Pagodroma.</i>	<i>Ossifraga.</i>
<i>Majaqueus.</i>	<i>Priocella.</i>	<i>Diomedea.</i>
	<i>Daption.</i>	<i>Thalassogeron.</i>
<i>Prion.</i>		<i>Phæbetria.</i>

I have already remarked on the degree of affinity between the group of parasites, which fall into three divisions, A—BCD—EF. Re-arranging the genera in these three divisions, according to the parasite groups, we have the following:—

A.	B.	E.
<i>Garrodia.</i>	<i>Procellaria.</i>	<i>Daption.</i>
<i>Oceanites.</i>	<i>Pelagodroma.</i>	<i>Pagodroma.</i>
<i>Oceanodroma.</i>		<i>Thalassæca.</i>
	<i>Pelecanoides.</i>	
CD.	EF.	
<i>Æstrelata.</i>	<i>Fulmarus.</i>	
<i>Puffinus.</i>	<i>Priocella.</i>	
<i>Priofinus.</i>		
<i>Majaqueus.</i>		
D.	F.	
<i>Prion.</i>	<i>Ossifraga.</i>	
	<i>Diomedea.</i>	
	<i>Thalassogeron.</i>	
	<i>Phæbetria.</i>	

Before proceeding to compare the classification thus arrived at with any other that has been proposed, I should like to lay particular stress on the fact that it has been arrived at *without any consideration whatever of the Petrels themselves*, purely from a study of one genus of parasites, and that it was constructed before I had consulted any ornithological classification of the group.

I now give for comparison the classification of Forbes ('Challenger' Reports, Zoology, iv. 1882):—

OCEANITIDÆ.

PROCELLARIIDÆ.

		PROCELLARIINÆ.	DIOMEDEINÆ.		
α.	{		η.	{	
		<i>Garrodia.</i>			<i>Diomedea.</i>
		<i>Oceanites.</i>			<i>Thalassogeron.</i>
		<i>Fregetta.</i>			<i>Phæbetria.</i>
	{	<i>Pelagodroma.</i>			
		δ.	{		
				<i>Æstrelata.</i>	
				<i>Puffinus.</i>	
				<i>Priofinus.</i>	
			{	<i>Majaqueus.</i>	
				<i>Bulweria.</i>	
		ε.	<i>Prion.</i>		
		ζ.	{		
				<i>Daption.</i>	
				<i>Pagodroma.</i>	
				<i>Priocella.</i>	
				<i>Thalassæca.</i>	
			{	<i>Fulmarus.</i>	
				<i>Ossifraga.</i>	

The correspondence between the two schemes is certainly remarkable. My evidence points to *Pelagodroma* belonging to the *Procellaria*, not to the *Garrodia* group; to the Fulmars being nearer to the Albatrosses than to the Shearwaters; and to *Ossifraga* being an Albatros rather than a Fulmar; but in all other respects the schemes coincide.

There is not time for me to discuss my results in detail, or to do much in the way of comparison with other classificatory schemes. But I would point out that, though my

material from *Pelecanoides* is very limited, it, nevertheless, does not support the isolated position usually given to this genus. Considering such a classification as that in Sharpe's 'Hand-list,' my confirmation of Forbes's general position indicates that the small Petrels are quite wrongly included in a single family; that such genera as *Thalassœca*, *Priocella*, and *Pagodroma* are Fulmars, not Shearwaters; and that *Prion* is not a Fulmar, but is nearer to the Shearwaters. I have no material from *Fregatta*, *Bulweria*, *Halobœna*, and one or two other rare genera, so can say nothing about them.

I think that the illustrations I have put before you will suffice to show that there is something in my ideas, and that, when I have as plentiful a material to argue from in other groups as I have had in the Petrels, I may be able to give you some useful indications. And, in closing, I would take this opportunity of appealing to those ornithologists who may be undertaking expeditions themselves, or who have collectors in the field, to have these insignificant parasites carefully collected, and placed where they may render service to the science of ornithology, a science in which I may claim to be interested as deeply as yourselves.

[NOTE.—Since the above was written, I have been able, through the kindness of Mr. W. R. Ogilvie-Grant, to examine for parasites some Petrel skins in the British Museum. The results show that *Pelecanoides* holds a much more isolated position than I have allowed, but at the base of the Shearwater group, that *Bulweria* goes with the Shearwaters, and that *Halobœna* may be bracketed with *Prion*.—L. H. 31.i.16.]

XII.—*On the Coloration of the Mouths and Eggs of Birds.*—

I. *The Mouths of Birds.* By C. F. M. SWYNNERTON,
F.L.S., F.E.S., C.M.B.O.U.

(Plate VII.* and text-figure 6.)

1. INTRODUCTORY.

WHEN I was in England in 1908, my old friend Mr. G. A. K. Marshall, regarding the accepted views on mimicry in insects as in some ways unsatisfactory, urged me to carry out, on my return to Africa, a long and critical series of experiments and special observations to test the validity of those views, as also of the various objections that had from time to time been levelled against them: to try to find out, in short, what really does occur in nature.

In the course of this investigation, which continued through several years, but was at first mainly concerned with insects and the food of insectivorous birds, one very interesting fact in particular came to light. It was unexpected, and at first even unwelcome, for it clashed with my preconceived view that most prey was "palatable." I will describe it below. Once accepted—and my animals forced it on me—it suggested a good contributory explanation for distinctive coloration, and, by doing so, induced me, amongst other things, to experiment in the preferences of bird- and egg-eating animals.

I have given in detail a large number of my experiments, including nearly all those on carnivorous animals, in a paper read before the Linnean Society on the 15th of April, 1915. I there discussed the question of the reliability of such experimentation as I shall describe in this paper, touching on every objection which, to my knowledge, had been brought against it, and stating the measures adopted to render the experiments as reliable as possible. I also made a preliminary statement of the bearing of my results

* For explanation of the Plate, see p. 293.



HEMPES PRESS WATFORD

MOUTHS



OF BIRDS.





generally on the problems and generally-accepted theories of animal coloration.

All I will do here, therefore, is, first to give a brief description of such few of these theories, and of my own results, as bear more especially on the appearance of the eggs and mouths of birds: this to avoid misunderstanding; and to discuss the explanation of the problems that their appearance presents; and, secondly, to describe in detail my experiments on some egg-eating animals. I hope in a later paper to give a fuller account of some of the other results and to discuss their bearing on the coloration of adult birds.

I take this opportunity to thank very warmly Mr. D. P. J. Odendaal, who helped to procure the eggs used in experiment; Mr. H. M. Wallis, who since I first stated my results at the April meeting of the B.O.C. has sent me much information of a most interesting character; and, for their kind permission to work at the eggs in their respective museums and their help while I was doing so, Mr. W. R. Ogilvie-Grant, Lord Rothschild and Dr. Hartert, Dr. Péringuey (Cape Town), Mr. F. W. Fitzsimons (Port Elizabeth), and Mr. E. C. Chubb (Durban). To no one am I more indebted than to Mr. G. A. Boulenger, who, while I was working at my nestlings in the Natural History Museum, placed every facility afforded by the Reptile-room at my disposal, and helped me much with information and suggestions.

2. THEORIES AND RESULTS REFERRED TO LATER.

Concealing or procryptic coloration, with some beautiful illustrations amongst birds, their nestlings and their eggs, is, nevertheless, not worth going into here, except to draw attention to the fact that, where a second, inner, surface is available for exposure, concealing coloration often forms a shield under which the most conspicuous warning (or other) coloration is developed and safely carried by animals whose unpleasantness to enemies is not so marked that they

can carry bright colour always exposed. The procryptic mantle is retained in these cases till detection becomes inevitable. Then it is dropped, and the hidden coloration revealed as a vivid last appeal to the enemy's memory. The young bird's mouth-colours when he opens his bill to an approacher, the coloration of the eggs when the nest is looked into, a butterfly's upper surface during motion, displays by animals fleeing or at bay, illustrate the principle.

Warning Coloration.—Originally his suggestion to Darwin in explanation of the "splendid" coloration of certain caterpillars, Wallace soon extended the idea of "warning" to the colours of numerous other animals, terrestrial and marine. "The animals in question are either the possessors of some deadly weapons, as stings or poison-fangs, or they are uneatable, and are thus so disagreeable to the usual enemies of their kind, that they are never attacked when their peculiar powers or properties are known. . . . They require [however] some signal or danger-flag which shall serve as a warning to would-be enemies not to attack them, and they have usually obtained this in the form of conspicuous or brilliant coloration."* "Thus the most gaudy colours would be serviceable and might have been gained by variation and the survival of the most easily-recognised individuals" (Darwin, 'The Descent of Man,' 1901 ed. p. 499).

"Deadliness" and absolute "inedibility" are rare qualities even in the unpleasantest of prey, and (as Prof. Poulton's experiments on the lizard, *Phrynocephalus mystaceus*, first indicated) the latter enjoys only a *relative* immunity from attack even when known, for the digestive secretions of a really hungry enemy can, and do, conquer much. Other modifications, too, can be suggested, but the principle of "warning" stands, backed now by much evidence.

The keen study of insect coloration that has taken place under Prof. Poulton's inspiring leadership, has secured an ample recognition of that principle by entomologists, and Mr. R. I. Pocock has made some very interesting suggestions

* Wallace, 'Darwinism,' p. 232.

with regard to its occurrence in mammals. In birds, Mr. G. A. K. Marshall carried out actual experiments with a Mongoose in 1900. This animal (Trans. Ent. Soc. iii. 1902, p. 378) refused "emphatically" an Owl, a Kestrel, a Buff-backed Egret, a Hobby, and a Drongo, but ate a Turtle-Dove, a Standard-wing Nightjar, a Dwarf Goose (*Nettopus*), a Moor-hen, and a Wheatear. "Its dislike of the smell of the Drongo was very marked, especially as it was hungry at the time; it made one or two attempts to eat the meat, but finally gave it up. In the case of this bird and the Egret, we would therefore seem to have a case of true warning coloration. This is also probably the case with the Wood-Hoopoes (*Irrisor* and *Rhinopomastus*), which are very conspicuous both in voice and colour" . . . and "both of which emit a strong unpleasant smell Another bird which has well-known distasteful qualities is the Ground Hornbill (*Bucorax cafer*)."
 Prof. Poulton had suggested previously ('Colours of Animals,' p. 159), that "the gaudy and strongly-contrasted colours of certain tropical species may be of warning significance."

Conspicuousness has always been regarded as of the essence of warning coloration. "Warning colours can be distinguished by the subordination of every other feature to that of conspicuousness. Crude patterns and startlingly contrasted colours are eminently characteristic of a warning appearance" ('Colours of Animals'). Nauseous animals of dull coloration have been regarded as lacking warning coloration. But recent results suggest that, while it may be convenient to thus restrict the term "warning" to those cases of startling conspicuousness which the word so well suggests, the *principle* comes in wherever unpleasant qualities are present, however dull the colouring. It is the *distinctive* element in an unacceptable animal's coloration that enables an enemy to differentiate it from an animal he is hungry enough for. Distinctiveness may be present even in concealing coloration, where it serves for the animal's identification when the latter element has failed to avert its detection. Conspicuousness is purely an auxiliary quality, though a

most useful one, and likely to be selected wherever that is possible, for impressing the enemy's memory and facilitating recognition, and for differentiating a nauseous animal the more strongly from those numerous species that have to depend instead on inconspicuousness for safety.

Distinctive Coloration.—This was explained by Wallace as having come about in response to the necessity for recognition by members of the same species, and “the wonderful diversity of colour and of marking that prevails, especially in birds and insects,” was ascribed “to the fact that one of the first needs of a new species would be, to keep separate from its nearest allies, and this could be most readily done by some easily seen external mark of difference” (*‘Darwinism,’* 1889, p. 218).

No one who has studied animals in the field from this point of view, can have failed to observe that Wallace was right, so far as birds were concerned, in attaching the very highest importance to the above factor. I could myself adduce numerous and striking instances of the use of their distinctive colouring and distinctive call-notes and displays by birds of the same species for keeping in touch, for joining up when widely separated and with numerous birds of other species in between, and for recognition generally.

That yet another factor besides this, and besides sexual selection, may, nevertheless, have contributed to the production of distinctiveness and diversity in the appearance even of adult birds and have been, perhaps, mainly responsible for it in certain other directions, is rendered likely by the results of my food-preference experiments. Using insects as prey, I found, whatever vertebrate enemy I employed, that not only would it at a given moment emphatically and persistently refuse some insects, while readily eating others, but that the finest gradation occurred between those species (grade Z, let us call them) that it would eat only under stress of hunger, through grades Y, X, W, V, &c., refused in turn as it gradually “filled up,” to the very few species (grade A), that it would regularly eat at all stages, right up to repletion point.

This was found to be as true in relation to wild birds as to captives. Was it also true of the birds themselves, regarded as prey? I experimented fairly exhaustively with more than a hundred species of birds on a cat, a lemur, and (less fully) an owl and a butcher-bird. In view of the relative size of the prey, I did not expect to find the "grading" at all fine; yet it was. Using meat-scrap from the different species, I found, as in the other case, every gradation from Z, only eaten when the animal was exceedingly hungry, right up through all the levels of growing repletion to A, accepted at all times up to repletion. Substituting the whole bird for the scrap of its meat, the same thing would occur. If the animal had refused the meat-scrap it would refuse the whole bird too. If it were easily hungry enough for the scrap, it would commonly tackle the bird itself, and might, appetite growing with eating, go on to make a full meal off it; yet, if it had been offered the same bird when only slightly fuller, it might have refused it absolutely. It was evidently a matter of relative digestibility and varying digestive power, a flow of the digestive secretions being stimulated when the stomach was empty by objects that were untempting, or even, as experiment showed, definitely inhibitive on a somewhat fuller stomach.

Obviously, if the above be the general rule (and I have so far found no exceptions to it), there can be relatively few species of animals that will not sometimes require to be distinguished by an enemy not hungry enough for themselves, from species (including, often, it may be, their own parent form) that he *is* hungry enough for. This suggests the contributory explanation for distinctiveness and diversity that I have referred to above. The necessity for differentiation from a pleasanter parent form will have been not the least important consideration, for unless correlated with some new distinctive character, a variation in the direction of increased unpleasantness will hardly have been selected. The cumulative action of this need for differentiation, where oft-repeated in the history of a species, might even be invoked to assist in the explanation of certain cases of

apparently exaggerated conspicuousness or elaboration of ornament.

To sum up :—

Distinctiveness and conspicuousness will, in the main, though by no means exclusively, have been selected in relation to the need for recognition, (1) by friends, (2) by enemies ; and *both* these factors will very commonly have contributed to the production of the distinctive characteristics of even a single species. I refer not only to distinctiveness of appearance, but to any characteristics—call-notes, smells, displays, &c.—that may be useful for differentiation by either friends or enemies.

“*Mimicry*” : *special protective resemblance*.—Special resemblances, both to other animals and to particular inanimate objects, were much noticed and written of at a quite early date, the first recorded case being Aristotle’s of the resemblance of a cuckoo to a hawk. But the first author who definitely applied to them a selectionist interpretation, only four years after Darwin and Wallace’s famous joint essay, was H. W. Bates, of Amazons fame. In his classical paper, “Contributions to an Insect Fauna of the Amazons Valley” (Trans. Linn. Soc. xxiii. pt. iii. 1862, p. 495), he enumerates cases of resemblance both to inanimate objects and to unrelated animals, links them by means of a longicorn group, some of the members of which resemble the former, some the latter, and claims the same principle for both. Moreover he maintains that in a day-flying moth resembling a wasp, the resemblance is “to protect the otherwise defenceless insect by deceiving insectivorous birds,” and suggests that, in butterflies, the “mimicry” of the Heliconidæ by *Leptalis* is analogous to this, only that where the wasp is avoided for its sting, the Heliconidæ, with a peculiar smell, abundant, and never seen to be attacked, “are unpalatable to insect enemies.” He mentions “two instances of mimicry in birds . . . communicated to me by my old travelling-companion, Mr. A. R. Wallace” (the now classical case of *Philemon* and *Mimeta*); and he suggests natural selection

as having brought about the resemblances, "the less perfect degrees of resemblance being, generation after generation, eliminated" by enemies that failed to be deceived.

There was, however, one class of case that still puzzled Bates. The mimicry of an unpalatable animal by a palatable one was easily explained. But equally good resemblances occurred where both "model" and "mimic" were unpalatable! Some of these, he thought, must be the effect of a similar environment acting on organisms related by affinity and already alike. Others, he apparently felt, were real cases of mimicry*, though, as both parties to the resemblance were unpalatable, he confessed himself unable to suggest the additional advantage, possessed by the "model" alone. It is in virtue of this that the members of the genus *Napeogenes*, for example, had come to mimic abundant and flourishing, and therefore presumably less persecuted, species of the Ithomiæ. Evidently the idea of varying degrees of unpleasantness failed to strike him (as it also failed to strike Müller); evidently, too, the advantage of sharing in the notoriety of the more abundant form, to avoid the numerous mistaken attacks that fall on a little-known species, did not occur to him.

Fritz Müller, writing in 'Kosmos' in May 1879, tried to solve the difficulty. He suggested that young animals, in sampling the qualities of unpalatable species, probably destroy about an equal number of the members of each such species with a separate colour-pattern, before learning to leave them alone altogether. It would follow that a scarce species, while losing the same absolute number of individuals from this cause, would lose a far higher percentage than an abundant one, and might profitably, therefore, mimic the latter. Again, it would be advantageous for two equally unpleasant and abundant species to adopt the same coloration, as, sharing the loss, each would now lose only

* As I read him: Prof. Poulton, however, doubts whether, in spite of his use of the word mimicry, Bates really regarded these cases as such.

one half of what it lost when their colour-patterns were different. This is, of course, what is known as "Müllerian mimicry," "common warning colours," or "synaposematism."

I have myself made a point of testing very fully indeed the validity of both theories. I found, in common with previous experimenters, that Bates was right in supposing that some species are pleasant and others unpleasant (it is a matter of relative digestibility rather than of "unpalatability"). But I also found—as Marshall had begun to find—that there were numerous *degrees* of unpleasantness. This at once extends Bates' principle even to the class of resemblance—that between unpleasant species—which had so puzzled him. I found moreover that Müller was wrong in supposing that after a certain number of tastings, approximately the same for each different appearance, young birds refrain from attack on unpleasant prey. Birds go on all their lives eating such prey whenever hungry enough—it may be several times a day—and, moreover, they go on all their lives making mistaken attacks, though these mistakes are less frequent apparently in the case of prey that they have frequently and recently met with.

From this last, it would seem to be true enough that an abundant species may be less persecuted than a scarce one with a different colour-pattern. But this comes about not in virtue of its incurring the same absolute loss as the other, as Müller supposed, but through a quite different principle—greater reminding-power and far less attack.

In this case, again, it may pay two species with the same unpleasant qualities to possess a colour-link in common, not in order to share between them a fixed and otherwise irreducible loss, but for greater reminding-power and facilitated recognition generally, resulting in lessened attack. This is "synaposematism" as it probably actually exists.

To sum up: (1) A pleasant species may mimic an unpleasant species and so share in its relative immunity from

legitimate attack—mimicry for shelter, one might say. (2) A less-known unpleasant species may mimic an abundant, well-known species, and so share in its relative immunity from *mistaken* attack—mimicry for due notoriety. Or, (3) conceivably, two abundant and unpleasant species may develop points of resemblance to one another, such as will associate them, to their mutual advantage, in an enemy's mind—mimicry for *increased* notoriety.

Mimicry is best regarded, perhaps, not as of different kinds but simply as mimicry, with the above as factors contributing to each particular instance in varying and not always easily-ascertainable proportions. For most mimics have some unpleasantness of their own, and there are probably few models that are not to some extent more unpleasant than their mimic, as well as more abundant. But, however they are built up, the function of many common groups to-day is, I believe, largely a matter of memory and simplification.

3. ON THE MOUTH-COLOURS OF NESTLINGS.

Towards the end of 1908, I was much struck by the mouth-markings of a brood of nestling *Estrilda astrild*. The possibility that both the pattern and the distinctive hissing sound uttered by the young birds might be of a "warning" nature—a reminder to enemies of the presence of some degree of nauseousness—at once occurred to me. I therefore made a coloured drawing of a mouth of one of the nestlings (Pl. VII. fig. 7), and resolved to follow up the observation by others. *Prinia mystacea* (fig. 8), *Colius striatus minor* (fig. 17), and *Pycnonotus layardi* (figs. 15, 38), were noted soon afterwards; but I shortly became absorbed in other directions, and it was not until late in the breeding-season 1912-13 that the distinctive and striking mouths of some nestling *Macronyx croceus* (figs. 19, 20), *Chloropeta natalensis* (figs. 9, 33), and *Centropus burchelli* (fig. 21), which I was rearing, recalled me to the subject.

The study is an extraordinarily interesting one. The

coloration of the mouths of nestlings is often of so striking and fascinating a character, with its well-marked pattern and its vividness comparable to those of eggs and of butterflies, that it is a matter for real wonder that so little attention has been paid to it. A few cases, such as that of the Gouldian Finch (*Poëphila mirabilis*), have attracted special remark, and led to an attempt at explanation. Mr. Collingwood Ingram, again, has given a summary of a considerable number of interesting observations in his paper "On Tongue-marks in Young Birds" ('Ibis,' 1907, pp. 574-578).

Recently, Mr. Pycraft, in his 'Infancy of Animals,' has discussed fairly fully the "more or less brilliantly-coloured" mouths of nestling Passerines, as also the significance and origin of the "ornaments"; and this is by no means his first or most important contribution to the subject, for the "direction-marking" explanation, undoubtedly applicable in certain cases, is his. But no one, I think, has published so many detailed observations on the subject as that admirable observer, Mr. G. L. Bates, has included in his "Further Notes on the Birds of Southern Cameroon" ('Ibis,' 1911, pp. 581-631). My own observations, mostly long subsequent to his, and all subsequent to Mr. Ingram's, were nevertheless, as accident had it, made independently. I fear it shows how irregularly I have studied my 'Ibis' when absorbed in other work!

Family-characteristics.—One of the first things that strikes the observer is the tendency to similarity between the nestling-mouths of related species. I will take some of the patterns in turn.

1. The twin-spot tongue. Twin spots, vividly black (usually, but in some birds paler), on or close below the two basal spurs of the tongue. Background most usually yellow or orange-yellow, but in some cases (*e.g.* White-throat and *Cisticola natalensis*, fig. 6) of some other colour.

The twin-spot tongue is essentially and primarily, I believe, a Warbler characteristic. It is least intense, according to Mr. Ingram, in *Sylvia*, but he has found it in

Palæarctic *Hypolais*, *Acrocephalus*, *Locustella*, *Cisticola*, and *Sylvia*; Mr. Bates describes it for West African *Cisticola erythrops*, *Calamocichla rufescens*, *Burnesia bairdi*, *B. leucopogon*, *Euprinodes rufogularis*, *Apalis binotata* (spots dark, not black), *Camaroptera griseoviridis*, and *Sylviella denti*; and I have found it (or in slightly older birds the remains of it) in south-east African *Prinia mystacea* (fig. 8), *Cisticola natalensis* (fig. 6), *C. cinerascens* (fig. 10), *Apalis thoracica*, *Chlorodyta neglecta*, and the Palæarctic *Sylvia cinerea*. That is, it occurs in all the fourteen genera of the Sylviidæ described by Mr. Ingram or Mr. Bates, or observed by myself. *Locustella* has a third spot, near the tip of the tongue.

2. The "domino" mouth. Symmetrically-arranged black spots on a pale palate. It is present with variations in many, probably most, of the Estrildinæ, such as *Spermospiza guttata*, *Pytelia nitidula*, *Poëphila mirabilis*, *Hypargos schlegeli*, *Lagonosticta rhodopareia* (figs. 4, 5), *Estrilda astrild*, *E. nonnula*, *E. melpoda*, *E. atricapilla*, *Nigrita luteifrons*, and *N. fusconota*. All have this mouth, the resemblance between the last six species being apparently particularly close, as also that between the above *Hypargos* (figured by Bates) and the *Lagonosticta* as noted by myself.

3. The plain orange mouth with paler flanges (greenish-yellow mouth in *Tchitrea viridis*) of all the Flycatchers but one described by Mr. Bates—*Fraseria ocreata*, *Pedilorhynchus comitatus*, *Erythrocercus maccalli*, *Trochocercus nigro-mitratus*, and *Tchitrea*. The exception was *Chloropeta* (figs. 9, 33), one that I have myself noted, too, and will refer to again below.

4. Plain yellow to orange, with paler flanges, is the colouring of some, at any rate, of the English thrushes, deeper in the Blackbird, paler in the Mistle-Thrush (fig. 26).

5. The scarlet-lake or crimson mouth with pale yellow flanges of the nestling Weavers of my acquaintance—*Hyphantornis jamesoni* (figs. 13, 18), *H. nigriceps*, *Sitagra ocularia*, *Amblyospiza albifrons* (fig. 1), and *Coliuspasser ardens* (figs. 2, 3); also *Pyromelana flammiceps* according to Bates.

6. The only two Doves, the nestling-mouths of which

I have examined, have these in each case dull plain brownish grey or grey-brown. They are *Chalcopelia afra* and *Turtur capicola* (figs. 24, 25).

It is the same when we come down to genera. We have considered some such cases incidentally already. Another is that of *Chloropeta*. The mouth of *C. batesi*, its finder's only aberrant Flycatcher, resembles that of *C. natalensis* (figs. 9, 33). Again, his *Pycnonotus* (*P. gabonensis*) has a white-flanged deep-red mouth. That of *P. layardi* (figs. 15, 38) may not be quite so deep or the flanges quite so white, but the two mouths are evidently not dissimilar. Mr. Bates' description of the mouth of the Green Bulbul (*Phyllostrophus simplex*)—flesh-red, and the swollen margin of the gape pale yellow—is even more like our *Pycnonotus*. His *Colius nigricollis* has a yellow, very conspicuous tongue in a slaty-black mouth, which must, therefore, much resemble that of *Colius striatus minor* (fig. 17). Plain yellow with paler flanges is the mouth of *Cinnyris venustus niasæ* (figs. 22, 23) at Chirinda, and whitish-flanged plain orange was that of Mr. Bates' *Cinnyris minullus*.

These instances might be added to, but they are sufficient to suggest, (1) that most of the resemblances occurring between nestlings' mouths are due to affinity; and (2) that the mouth-patterns of nestlings may, as Mr. Ingram has suggested, "prove of some small taxonomic value." But I would add, they should be used with the caution that coloration always demands. That it is very necessary here is shown by the existence of exceptions.

The two species of *Chloropeta* I have mentioned, "have," in Mr. Bates' words, "the inside of the mouth and the tongue orange, and the tongue has a pair of black spots at the base—a character found in no other nestling Flycatcher." And it is, as we have seen, a Warbler character. Similarly, the Hedge-Sparrow has a Warbler tongue. The English Skylark's tongue (fig. 30), black-tipped, is not unlike that of *Locustella* in its spotting, and the tongues of *Motacilla raii* and *M. lugubris* are, Mr. Ingram tells us, like those of *Sylvia*—or is it that *Sylvia* has varied

in the direction of *Motacilla*? Again, in depending for distinctiveness on the contrast to a dark background of its two bright rows of palatal papillæ, the mouth of *Macronyx croceus* (figs. 19, 20) resembles to that extent the mouth of the Bearded Tit (the actual appearance must be very different owing to its lacking the latter's black patch); yet the two birds are not related. The mouth of *Cisticola cinerascens* (fig. 10) also much more resembles that of *Prinia mystacea* (fig. 8) than it is like that of its own congener, *C. natalensis* (figs. 6, 12), the result of a quite different ground-colour. There is a strong likeness between the mouth-coloration of *Pycnonotus layardi* (figs. 15, 38), *Hyphantornis jamesoni* (figs. 13, 18), and a *Chrysococcyx* (fig. 14), parasitic on the latter, yet no affinity is present. The three Bulbuls already mentioned have a bright or deep flesh-red mouth, yet another, *Phyllostrophus flavigula*, has an orange mouth, and yet another, *Andropadus latirostris*, has it yellow.

Meaning of the distinctive coloration of nestlings' mouths.—

The only explanation attempted up to the present, so far as I am aware, has been that of directive markings, on the analogy of the explanation given for certain markings in flowers. Mr. D. Seth-Smith, at the B. O. C. meeting at which I first stated my results, mentioned the semi-luminous, bead-like blue warts which are present on the sides of the base of the mandibles in the nestlings of certain species of birds, such as the Gouldian Grassfinch (*Poëphila mirabilis*) and the Parrot-Finches (*Erythrura*). He remarked that these appeared to be necessary in order to indicate to the parent-birds where to place the food. When feeding, the parent stood in the entrance-hole of the nest, excluding almost all light, and in this position the nestlings were nearly invisible; but when their mouths were opened these could be easily located by the presence of the blue beads, which were placed, as it were, at each corner of a square.

It seems to me exceedingly probable that the function of the blue beads in these and other species is directive, and that usefulness for directive purposes may, at any rate, have

contributed to the selection of special markings or a pale-flanged dark mouth in other cases as well. But as a complete explanation for the whole of the striking phenomena of the coloration of nestlings' mouths the explanation is inadequate, and I am inclined to agree with all that Mr. Ingram says on the subject ('Ibis,' 1907, p. 576).

Thus, the mouth of a Starling (*Lamprocolius splendidus*), which nests in a hole, is described by Mr. Bates ('Ibis,' 1911, p. 542) as follows:—"Flesh-coloured tinged with yellow" with "conspicuous white mouth-flange" and a dark tongue "becoming black at the base." This strikes one as, perhaps, a very perfect instance of what, with variations, we might naturally expect throughout if the "directive marking" view be universally applicable, even the excellent device of luminous points on the outer margin, as described for *Poëphila*, being hardly an improvement on such a mouth. Yet in the English Starling, which also builds in a hole, the mouth remains plain bright yellow, like that of the Mistle-Thrush (fig. 26), the Fiskal Shrike (figs. 16, 47), and a number of other nestlings whose parents lay in open, brilliantly-lit nests. In this case, at any rate, the plainness would appear not to have been of such great detriment as to necessitate the selection of an additional signal for use in holes. And even these plainly pigmented mouths, whether in holes or out of them, require some explanation.

Again, if we admit that in the Warblers which build domed nests, the twin spots at the base of the tongue have been so vitally useful "directively" as to have been selected for that reason alone, while *Sylvia*, taking again to open nests, has begun to have the spots obscured; and if we argue similarly for the white spots of the Bearded Tit (some of the most conspicuous of which, like the third spot of *Locustella*, seem to me to be frankly *mis*-directive). Why, then, is it that *Alauda* (fig. 30), nesting openly on the ground, has adopted the same spots as the Warblers—with the addition, it is true, of three spots as widely misdirective as the length of the tongue and the mandibles will allow? Why has *Macronyx* (figs. 19, 20), nesting openly on the ground, developed the same markings as the Bearded Tit? Is there any really good reason to

suppose that these Larks and Pipits have abandoned the habit of laying in holes or domed nests so relatively recently that the directive (and misdirective?) markings, no longer of real value, have not had time to disappear? Why has the Hedge-Sparrow nestling, lying in an open nest, a mouth even more like a Warbler's? And why has the one Flycatcher that chuses to stray from the normal coloration of its kind also adopted directive markings, indistinguishable from those of the Warblers'; while at the same time it continues to use a wide-open nest, built in the most open and brilliantly-lit situation chosen by any Flycatcher that I know, namely (in my experience) on the upper surface of high-placed bracken fronds? And why are the resemblance between the tongues of some of these unrelated birds so nearly exact? Where a plain yellow mouth like the English Starling's, a twin-spot tongue like the Warblers', and a mouth with black spots at the tips of the tongue and mandibles, are each and all directive, or, at any rate, apparently equally successful in getting abundantly fed, what matter to *Accentor* and *Chloropeta* if their mouths should *not* be quite Warbler-like? Of what value, on the view of directive markings, is it to the young *Chryococcyx* to have a mouth coloured like that of the young of its *Hyphantornis* host? Were it plain yellow, or crimson, or brown (or even with twin spots or "domino" palate, for the nest is domed), would the Weaver foster-parents, unused to all but plain pink, waste time in uncertainty and the young Cuckoo be ill-nourished?*

Some of my questions are, perhaps, not unanswerable, but I have attempted to show that the "directive marking" principle, though doubtless in some cases present and highly useful, will not explain the whole of the phenomena, nor, indeed, does Mr. Pycraft make any such claim. After all, it is nestling mouth-colour generally that wants explaining—its vividness, its distinctiveness, and its fairly considerable

* I have since placed a young Weaver (*Sitagra ocularia*) in the nest of a Flycatcher (*Chloropeta*), and watched its feeding. The Flycatcher seemed to experience no inconvenience whatever from the different mouth-colour and the absence of twin spots, or even from the rapid vibration of the head.

diversity—and not merely certain spots in the mouths of nestlings in holes and domed nests. Such spots are as often as not absent from mouths, which observation in the field shows are often vividly displayed, wide open, in the brilliant light of day through the opening in the nest on the latter being jarred, just as the nestlings in open nests crane their heads and open mouths upwards. The “directive” analogy was from flowers. Nestlings, like flowers, “heliotrope.”

Pressing the analogy, I may say that, even in the matter of flowers, it is recognised that the theory of directive markings has sometimes been carried too far. As Kerner and Oliver remark (*Nat. Hist. Plants*, vol. ii. p. 191):—“It would be too much to say that all spots are to be regarded as signals, or to call them ‘honey-indicators’ or ‘path-finders.’” Markings in flowers are, in very numerous cases, apparently useful only for giving them a distinctive appearance (as, in another case, a plain colour might), whereby they may be the more readily differentiated from the parent form and other species by the pollinating insects, that prefer them to these; and this “distinctiveness for recognition” brings us down to an explanation which I believe to be somewhat widely applicable to the distinctive coloration of nestlings’ mouths.

Distinctiveness for ready differentiation by enemies.—I will first quote, for what it may be worth, a conversation with my native trapper, Mandina. It is recorded more fully in my longer paper.

“ We went on to discuss nestlings. I said: ‘Have the nice birds always nice nestlings, and the less nice birds less nice nestlings?’ He said: ‘No; nestlings are always far less nice than their parents; the younger they are the unpleasanter they are, and we generally leave them until they are, at any rate, getting their wing-feathers. But even then they are not so nice as when they are beginning to fly, and when beginning to fly they are less nice than when full grown.’ I said: ‘I know you usually leave young nestlings to fledge before taking them; but is not this to get a bigger meal out of them?’ ‘Partly,’ he

said, 'but they are left for the other reason, too—to get rid of the *Ipunga* (smell or flavour). Of birds that we eat in the adult state we eat the nestlings too, but we like them all less than we do the old birds. Very small nestlings are not eaten at all except by certain people who do not seem to mind the *Ipunga*. It is strongest in newly-hatched birds, and that is the chief reason why we let them remain till the feathers appear.' 'Is this *Ipunga* a taste or a smell?' 'You taste it in the mouth, but you can often smell it, too, in very young nestlings.'"

In the light of the law of complementation, the idea is probable enough; for a nestling, unable to fly away from its enemies, may well require some slight additional protection beyond numbers and such concealment and defence as the nest and its own appearance and the parent birds may afford. Various young butterfly larvæ (also the eggs) are far less readily attacked by driver ants than when they have grown larger and developed emissible juices or procrystic coloration. The seedling foliage in some groups of plants is more disliked by herbivorous animals than the adult foliage, normally out of their reach. Still, young rooks are excellent eating! So, pending special experiment, I give the view, widely held amongst our natives, merely for what it is worth.

It is, in any case, not required for our purpose. Experimenting, even with adults and somewhat immature birds—in two or three cases with actual nestlings—I found many species that were disliked, and a fine gradation between the best-liked species and the worst, as I have explained above under "Distinctive coloration." Therefore, remembering that nestlings tend to open their mouths wide to all comers, and that, in youngish nestlings especially, the large wide-open mouth is the most visible portion—that, in fact, there is often nothing but mouths visible when all the nestlings crane upwards or outwards together—I would suggest that the distinctive coloration of the mouths of nestlings has, to a large extent, been retained in relation to the necessity for ready differentiation by enemies, or for the differentiation,

by them, of a nestling they are not hungry enough for, from that of such species as they are, at the moment, hungry enough for. It is quite true that an insufficiently hungry enemy may come back when he next is hungry enough, and in the immediate neighbourhood; but the chance has been given to the parent birds to remove their young (and they often take the hint), or even to bring them off in safety before the nest is revisited—as we ourselves, wishing to rear the young birds, sometimes find has happened.

The conspicuousness of many of the mouths, as apart from mere distinguishability, is doubtless of use in impressing their appearance on the enemy's memory and facilitating their recognition when seen again. It is for readier recognition; and the selection and development of this character have thus been rendered possible, in spite of the apparent disadvantage that the result may facilitate detection; for the mouth is only opened and its brilliant colours displayed when the nest is approached and likely to be seen in any case.

Mimicry—for protection or increased notoriety—may help us to account for some of the mouths, though the material is still far too scanty to admit of a positive interpretation.

Take first the Warblers. The twin spots are probably an ancestral character common through affinity to all such Warblers as now possess them. That their retention may have been in part due to their continued usefulness and consequent selection is not, however, impossible. "All the butterfly sub-families, which furnish the chief models for mimicry, are remarkable for the uniformity of colour and pattern throughout groups of species in each of the countries they inhabit. . . . A very strong family likeness runs through long series of species."* This can be accounted for by the advantage of maintained notoriety. It has not brought about the resemblance—affinity sufficed for that,—but it has tended to prevent divergence. If Warbler nestlings generally are to some slight extent unpleasant to their enemies, their common retention of the characteristic mouth may in the same way have been in part a matter of "common

* Poulton, 'Essays on Evolution,' p. 277.

warning colours." Any additional advantage the twin spots may possess as directive markings would doubtless also have contributed to their retention.

Chloropeta natalensis (figs. 9, 33), a Flycatcher with a very vivid Warbler-like mouth, falls into the same colour-group at Chirinda as *Cisticola cinerascens* (figs. 10, 11) and *Prinia mystacea* (fig. 8), an abundant Warbler that, experimenting with adult and still immature birds, I found to be fairly low-grade—disliked, that is, to a fair extent by the animals I tried it on. The three birds inhabit the same "veld"—grass country interspersed with bracken, low shrubs, &c., and they build at about the same height from the ground, and thus probably possess the same nestling enemies. So that the resemblance, if, as I think, it is advantageous to the Flycatcher, is probably being retained by selection to-day whether it originally arose as mimicry or by coincidence pure and simple, or from the retention of or reversion to a mouth-pattern more ancestral than the present spotless mouth of its relations. The rejection of the present normal colouring might have been associated with the Flycatcher's taking to a new kind of station (as it has done) and so coming in contact with the enemies of the Warblers whose station it had invaded instead of its old enemies, acquainted with the plain orange Flycatcher mouth such as would often be met with in bush country; and its new lack of notoriety might have been the main factor in bringing about the selection of the likeness. At any rate, my experiments with the adult birds do not lead me to suppose that nestling *Chloropeta* is likely to be better liked by enemies than nestling *Prinia*. That *Chloropeta batesi*, of southern Cameroon, should have the same mouth is, in itself, no objection to this view. The resemblance to a yellow-mouthed Warbler may have arisen first in an ancestor of the two species and have continued in themselves through the advantage it still afforded them, much as I suggested for the distinctive mouth of the Warblers.

Resemblances, and particularly resemblances in such simple patterns as we find in birds' mouths, so often arise

quite independently—demonstrably so—that suggestions of mimicry should be made with caution and reserve. Again, someone may some day demonstrate that *Chloropeta* is itself a Warbler! In that case, too, I will gladly withdraw my suggestion.

Or—as I have already practically suggested, and as is exceedingly likely—fuller records may show that the twin-spot tongue is to the mouths of nestlings what the longitudinally-striped pattern is to the down-plumages of young birds—an ancestral character of extremely early date, surviving in a number of now unrelated descendants through the advantages it still continues to offer those particular species or groups of species; not in this case advantages of concealment, but of easy memorability. I am finding the twin spots, since I first wrote this paper, in more and more birds—*Zosterops*, *Erithacus*, *Laniarius*, &c.

Yet another case of homœochromatism is found at Chirinda in the nestling-mouths of *Pycnonotus layardi*, *Hyphantornis jamesoni*, and a *Chrysococcyx*, probably *C. cupreus*, found in the latter's nest (figs. 13–15). Not looking at it carefully, I took it for granted that the young Cuckoo was a Weaver, and continued to do so until after opening its mouth and settling down to draw it. Then I noticed the palate and, looking, found the raised nostrils. *C. cupreus* lays much, I believe, in nests of *Hyphantornis*. Whether its other hosts are as well chosen in the matter of mouth-colour I do not know. Should this prove not to be a mere isolated coincidence, the question might arise whether it might have come about by the discriminative action of enemies or of the parent bird. The latter seems to me more likely to come into play in eggs than in relation to the hatched bird*. The presence of the

* Since writing this I have placed a young *Sitagra ocularia* in the nests of a Rock-Thrush (*Monticola angolensis*) and a Flycatcher (*Chloropeta natalensis*). It was adopted in each case, in spite of its different external appearance, its very different mouth, its extraordinary manner, and its different call-note. The Rock-Thrush had ejected eggs not its own—a most interesting and significant fact which I will acknowledge more fully later.

Bulbul in this homœochromatic combination is at first sight interesting, but it would be unsafe to suggest mimicry until more is known of the mouths of Bulbuls and Weavers generally, where geographically associated and where not. I quote from my original note on the bird whose mouth is figured (Pl. VII. fig. 15):—"18.3.13. *Pycnonotus layardi*. Barely beginning to feather. Three in nest, all same. Mouth-likeness to *Hyph. jamesoni* extraordinary, and same wobble of head. Has a rather Weaver-like food-note too, 'tsip, tsee,' as well as a more Bulbul-like tone. . . . Sometimes brighter than at others, even nearly carmine." I found, in fact, that when I opened the mouth myself it was dull pale brownish in coloration, the bright colour that makes it so like the Weaver's mouth being, in this case, evidently due, not to pigment, but to a rush of blood to the mouth under the stimulus of eagerness. So much at present for resemblances.

Highly distinctive mouths were those of *Colius striatus minor* (fig. 17)—a yellow "lantern" of a fleshy tongue in a black mouth—and, yet more distinctive, *Centropus burchelli* (fig. 21)—tongue crimson and black, with white papillæ (the latter not so conspicuously displayed as in the figure) in an otherwise unpigmented mouth, and with its own terminal third unpigmented. The young birds of *Centropus* had "a remarkable wheezy food-call, uttered continuously when anyone was present, the tongue being pushed rapidly back and forth meantime with mouth wide open and directed straight at the approacher." One of these nestlings that I offered to a lemur and a cat was apparently much disliked by them. A youngish *Trachyphonus cafer* (fig. 44) that I shot still showed strong traces of what seemed to have been a similarly coloured tongue less strongly, as did an *Indicator*, a matter probably of affinity. Yet another rather striking mouth was that of a nestling *Macronyx croceus*, which I have also figured (Pl. VII. fig. 19). I do not know the food-status of this nestling. The eggs were much disliked by my rat, while the adult birds were placed quite high in the scale of palatability, though not amongst the pleasantest, by my cat

and lemur. It may be that the nestling is intermediate. But even a very slightly unpleasant species will, if it be unpleasant at all, derive much advantage from a conspicuous and easily remembered appearance. The only question is, Can it safely carry it—as a highly nauseous species often can? The shut mouth of a young bird is a sufficient shield from this point of view. Being seen, nevertheless, its one remaining chance of averting attack is identification. Hence the distinctive colouring.

It was interesting that both the Doves examined had very dull mouths. Their mode of feeding, and the fact that they do not open their mouths when approached—they cannot to any great extent—had led me to expect this. Young Night-jars, again (in my experience), tend only to open their mouths when they are actually touched—doubtless a part of the procryptic scheme—and their very large canvases remain quite unpainted.

Other distinctive characteristics.—I have referred to the extraordinary tongue-action and wheezing sound of young *Centropus burchelli*, also to the nestling notes of *Pycnonotus layardi* and the extraordinary vibration of the head that the same nestling possesses in common with *Hyphantornis jamesoni*. It is a regular Ploceid character, and it would be interesting to know whether it is the exception or the rule in *Pycnonotus*. There is almost as much distinctiveness and diversity in the food-calls and the birds' actions as there is in the mouth-patterns. The soft long-drawn "pwee pwee" of young *Chalcopelia afra* (least relished of all our Doves), compared by my wife to the very distant call of a Gull; the loud musical trill, like a cricket or tree-frog, of young *Macronyx croceus*; the wheeze of *Centropus*; the rather bell-like squeak of a *Coliuspasser*; and the rather short pleasing note, hard to describe but differing from all the above, of *Cisticola natalensis*, are examples. The marked differences between them can, at first sight, serve no very useful purpose in relation to the parent bird, though the mere fact that the species, and the adult call-notes, are different might

sufficiently account for most of them ; but they are likely enough to be useful in “reminding” enemies, and I am inclined to think that there is quite a mnemonic element in some of these calls and displays. I am unable to refrain from quoting Mr. Bates’ description of the behaviour of five young Kingfishers, *Alcedo guentheri* (‘Ibis,’ 1911, p. 515):—“While they remained alive for a few hours in a box, one of them continually made a most curious noise, something between a rattle and a fizzle, rhythmically varied in loudness by the opening and closing of the bill. Only one bird did this, and always the same one, while the rest remained silent. When that one was removed another, after some minutes, took up the rôle of ‘soda-water bottle,’ and when *that* one was removed *another* commenced. There was always one ‘fizzler’ only.”

In the external appearance of nestlings one also comes across many instances of moderate and a few of strong, even conspicuous, distinctiveness. Such are the special ornaments of the young Coot and Great Crested Grebe ; the extraordinary general appearance of the nestling of the Lark-heeled Cuckoo, *Centropus burchelli*, quite black with sparse thread-like hairs of purest white (the down feathers) all over the upper surface ; and, Mr. Wallis suggests, “the intense hairy blackness of the nestling in down of the Water-Rail. This is so conspicuous that it must have a cause, for it is not protective as is the marking of the Snipe in down.” He goes on to mention its “fair” resemblance to “the larva of the Cream-spot Tiger-moth, which feeds on comfrey in the same marsh”*.

* It is interesting to quote the rest of the passage :—“The half-grown Lapwing, just when his back is getting green, but whilst tufts of down are still on him, is a most repulsive object. He lies about openly among the cows in a pasture and mimics a mass of wet, green excrement in which the mould is beginning to sprout, so exactly that nineteen people out of twenty would not touch him. Of course you know the immense yellow gape of the nestling Cuckoo, and his toad-like appearance. Country children have been afraid to touch one. You know the intense, hairy blackness, &c.”

Quite possibly, in such cases as the Grebe and Coot, the conspicuous feature is often useful, as Mr. Pycraft suggests, as "a recognition mark, enabling the parents to find the young after they have dispersed into hiding to avoid an enemy"; but I cannot help suspecting that all these cases will probably be found to resemble the *Centropus* in the possession of some degree of nauseness, and that the main factor in the selection of the distinctive features—or in their retention in the nestlings if they were originally selected in adult ancestors—will have been the need for differentiation by enemies from pleasanter geographically-associated species and a pleasanter parent-form, conformity with that necessity being brought about by mistaken attack and unmistakable refusal. On this view there is far less difficulty in accounting for ornamentation, not only in nestlings but throughout the animal kingdom, including those cases in which the possession of a conspicuous distinctive feature constitutes a departure from the rule of the genus or family, and for that other class of case, often quoted, in which two animals, be they adults, young, or eggs, are found exposed to the same environment and the same enemies and possessing similar habits: yet one is conspicuous, the other concealed.

Distinctiveness of a less marked order is less uncommon and, in naked nestlings, depends much on skin-colour. I have thought that blackness might be for protection from the sun. That this is not the only factor, if it be one at all, is shown by the fact that, at any rate in Africa, some of the blackest as well as of the least pigmented nestlings are found in covered nests. Both are also found in open nests. The influence of enemies will have to be invoked, I believe, to help us to, at any rate, a complete understanding of nestling appearance, and, incidentally, of some of the resemblances between unrelated nestlings. Those between Hawks and Owls and those between the members of some naked colour-groups are quite likely neither in their origin nor in their use entirely a matter of mimicry; yet the resemblances are

probably of much service in associating them in the minds of enemies, and this may have contributed to their selection.

4. NOTE ON THE MOUTHS OF ADULT BIRDS.

The mouths of adult birds are, in very numerous instances, quite as brilliant and striking as those of nestlings—often more so,—but in very few cases are they the same. After the young bird leaves the nest the mouth begins to alter, and at last takes on the full coloration of maturity. The old nestling combinations between different species have disappeared in the process, and new colour-associations are formed, to a far greater extent amongst unrelated birds than before. We have at Chirinda a black-mouthed combination, an orange-mouthed association, one with a yellow mouth with black extremities, another in which the yellow of the last is replaced by pink, yet another in which pink stands alone, and another which is entirely yellow. I will describe them all in greater detail later, and will figure members of some of the main associations to show what diverse and unrelated species have a similarly marked mouth when adult.

It may at first sight seem far-fetched, but I cannot help being convinced myself that the distinctive mouths of adult birds are explicable in much the same way as I have suggested for those of nestlings.

Everyone who has made a large collection of birds must have sometimes had the mortification of wounding one, and will have observed that a bird at bay, as a rule, holds its mouth open. I have had a good illustration of this. One night I was awakened by the fluttering of my birds in cages in the verandah. I went out. It was brilliant moonlight, and an Owl, *Syrnium woodfordi*, was swooping in at the cages. Stopped by the wire he each time wheeled round and stooped again. The occupants of the cages (insectivorous birds) were all down on the ground, terror-stricken, with their bills wide-open.

I feel that this unconscious display of the mouth-colours is equivalent to the final display of their concealed bright colours by so many insects when cornered and unable to escape. It is the last appeal to the enemy's memory, and the colour-groups I have referred to above are in some cases, I believe, in the nature of mimicry and "common warning colours."

Actually, there are three occasions on which a bird opens its mouth to an enemy—when a nestling, when at bay, and when mobbing. Even under the latter circumstances the display may conceivably be useful. But adult birds also sometimes show their mouths in ordinary intercourse and in courtship. I have seen this myself in Drongos and Hornbills, and it has been recorded for various sea-birds. Again, the female's mouth sometimes differs from the male's.

These two facts at once suggest, for the complete explanation of mouth-colours, the discussion of factors I have not yet touched on. They are best discussed with any real fullness under adult plumage and in connection with my detailed observational and experimental results from adult birds; but the brief discussion of one of them, and a short general statement of view, will be in place here, and the latter will help to preface my remarks on the coloration of eggs.

There is nothing new in the view that such sexual selection as would seem to take place is based, not necessarily on an admiration of the brightest suitors, but on a tendency to be attracted instinctively by masculine males and feminine females—according to the species, general standard of masculinity and femininity (which may or may not include brightness), and to fail to be thus attracted by atypical members of the species or of the opposite sex. But the instinct would be based, in turn, on the fact that atypical individuals and those showing the characters of the opposite sex are commonly specifically or sexually inefficient. Sexual selection might, therefore, be regarded both as a time-saver

for the fitter mates, and as one of several "tonic" factors that have themselves, perhaps, been selected for their bur-nishing effect on the specific and sexual characters that are actually useful in the struggle for existence and their accen-tuation of the general vigour and vitality of the species. The relationship thus suggested for vitality and orna-mentation is one of common effect, not cause and effect. Other tonic factors, such as combat and persecution of the atypical, will, in many cases (as, apparently, in the Warblers), replace sexual selection wholly or in part, and the latter's complete or partial absence in these and other cases by no means proves its invalidity elsewhere. Elimination, again, may be indirect as well as direct. A female (or male) attracted now may already, by failing to be excited on former occasions, have relegated several potential mates to the greater likelihood of a poor or sterile match that will tend to result from delay; and discriminative coyness could produce selection of this less direct kind even where the sexes are equal in numbers.

This all brings us down to the view that display in court-ship, though in many cases it has come to be modified and elaborated in special relation to courtship, is, in its essence, an exhibition of prowess or fitness in the various qualities—including distinctive coloration—that make for success in the everyday life of the species. That, in its origin, it had nothing to do with courtship, is suggested by the fact that the plumage-display, or mouth-display, of an animal at bay is often nearly identical with that of an animal courting, though without the added elaboration.

One such (perhaps unconscious) claim to fitness, in a character useful "in real life" mainly in relation to enemies, is probably represented by the mouth-display I have referred to just above. The fact that the coloration of the mouths was dull in the Hornbills, brilliant in the sea-birds (yet the same in both sexes), and somewhat different in the sexes of the Drogos, is in line with the fact that bright and dull plumage, plumage common to the sexes and plumage that is not so, is equally displayed in courtship; and both facts are

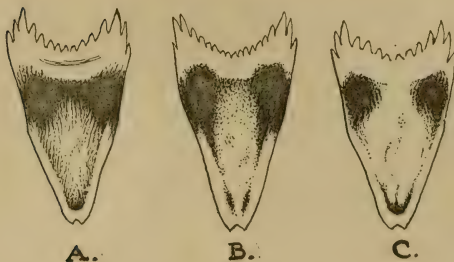
in full conformity with the view that the display in courtship is essentially an exhibition of specific and sexual efficiency.

Four years ago, I held the above view of sexual selection, but I did not regard it as likely, by itself, to make appreciable headway against the powerful factors that make for dullness, and I felt that bright colours and ornamentation could, perhaps, be sufficiently accounted for without it. But my later work, seeming for certain cases to eliminate alternative explanations and revealing unsuspected counteragents, convinced me that the selection of the *beau-idéal* may, under certain circumstances (as in the case of polygamy), have produced great results. I am unable, without it, to account to my satisfaction for the breeding-plumage of male *Pyromelana* and *Coliuspasser* among the birds best known to me in the field, and, as well as the reserve of males, a good contingent present here is in the habit of slipping down under the herbage when threatened.

I have gone into the question a little fully, on account of the striking use of the mouth-colours in courtship and also because we have, in the usually-closed mouth of a bird, so excellent a counteragent for brilliance within it that sexual selection might be expected to have here found a field for its accentuative operations. My adult mouths, since I took up mouth-coloration, have been mostly dry-season. Breeding-season mouths may or may not repay a special study.

Note.—Since writing the above I have come across several unusually reversionary tongues of nestling Warblers and *Pycnonotus*—the latter entirely instead of submarginally dusky as figured for this species and for *Macronyx*. These rather strongly suggest a derivation of the three-spot and twin-spot tongues from a generally dusky tongue. I figure three of such tongues among the Warblers (text-figure 6). The order is, of course, different from that suggested by the incomplete *Dryoscopus* series described above.

Text-figure 6.



Transitional nestling tongues. A and C, of *Prinia mystacea*, B, of *Cisticola cinerascens*, illustrating the evolution of the three-spot and the twin-spot tongues from, probably, a generally dusky tongue. The figures should be studied in conjunction with Mr. Collingwood Ingram's ('Ibis,' Oct. 1907, p. 575). The continued presence of scattered black-pigment cells, even on the cleared portion of the tongue, is interesting, as is their linear arrangement in the *Prinia*.

Another interesting point, previously overlooked, is Mr. Bates' observation to the effect that *Cisticola erythrops*, even when adult, never loses the twin spots. Both observations have a possible bearing on the question, Are the spots a nestling adaptation? and the first may be used as an argument in favour of that view, seeing that some (but not all) of the mouths concerned turn black again when the nestling stage is over.

EXPLANATION OF PLATE VII.

- Fig. 1. *Amblyospiza albifrons*, mouth of nestling.
 Fig. 2. *Coliuspasser ardens*, mouth of nestling. Fig. 3. Mouth of adult.
 Figs. 4 and 4a. *Lagonosticta rhodopareia*, nestlings. Fig. 4b, mouth of adult. Fig. 5, mouth of young.
 Fig. 6. *Cisticola natalensis*, mouth of fledged nestling; 6a, of younger nestling; 6b, tongue only of intermediate stage (for adult see fig. 12).
 Fig. 7. *Estrilda astrild*, head of nestling.

- Fig. 8. *Prinia mystacea*, mouth of nestling; 8 *a*, of adult; 8 *b*, of intermediate stage.
- Fig. 9. *Chloropeta natalensis*, mouth of nestling (for adult see fig. 33).
- Fig. 10. *Cisticola cinerascens*, nestling just hatched. Fig. 11, mouth of adult.
- Fig. 12. *Cisticola natalensis*, mouth of adult (nestling, fig. 6).
- Fig. 13. *Hyphantornis jamesoni*, mouth of nestling (adult, fig. 18).
- Fig. 14. *Chrysococcyx* sp., mouth of nestling found with no. 13.
- Fig. 15. *Pycnonotus layardi*, mouth of nestling (adult, fig. 38).
- Fig. 16. *Lanius humeralis*, mouth of nestling (adult, fig. 47).
- Fig. 17. *Colius striatus minor*, mouth of nestling; 17 *a*, of adult.
- Fig. 18. *Hyphantornis jamesoni*, mouth of adult (nestling, fig. 13).
- Fig. 19. *Macronyx croceus*, mouth of nestling. Fig. 20, of adult.
- Fig. 21. *Centropus burchelli*, mouth of nestling.
- Fig. 22. *Cinnyris venustus niasae*, mouth of adult. Fig. 23, of nestling.
- Fig. 24. *Chalcopelia afra*, part of mouth of nestling.
- Fig. 25. *Turtur capicola damarensis*, mouth of nestling.
- Fig. 25 *a*. *Dryoscopus guttatus*, mouth of nestling just hatched; 25 *b*, tongue of immature; 25 *c*, of adult ♀; 25 *d*, of adult ♂.
- Fig. 26. *Turdus viscivorus*, mouth of nestling.
- Fig. 27. *Turdus libonians tropicalis*, mouth of adult.
- Fig. 28. *Sigmodus tricolor*, mouth of adult.
- Fig. 29. *Campephaga nigra*, mouth of adult ♂.
- Fig. 30. *Alauda arvensis*, mouth of nestling.
- Fig. 31. *Telephonus senegalus*, mouth of adult.
- Fig. 32. *Crateropus kirki*, mouth of adult.
- Fig. 33. *Chloropeta natalensis*, mouth of adult (nestling, fig. 9).
- Fig. 34. *Laniarius* sp., mouth of adult.
- Fig. 35. *Bradiornis murinus*, mouth of adult.
- Fig. 36. *Trochocercus albonotatus swynnertoni*, mouth of adult.
- Fig. 37. *Dicrurus ludwigi*, mouth of adult.
- Fig. 38. *Pycnonotus layardi*, mouth of adult (nestling, fig. 15).
- Fig. 39. *Phyllostrophus flavistriatus*, mouth of adult.
- Fig. 40. *Anthus pyrrhonotus*, mouth of adult.
- Fig. 41. *Trochocercus* sp., mouth of adult.
- Fig. 42. *Trachyphonus cafer*, mouth of adult ($\frac{3}{4}$ nat. size).
- Fig. 43. *Rhinopomastus cyanomelas*, mouth of adult.
- Fig. 44. *Trachyphonus cafer*, tongue of an immature.
- Fig. 45. *Irrisor erythrorhynchus*, mouth of adult ♂.
- Fig. 46. *Vinago delalandei*, mouth of adult.
- Fig. 47. *Lanius humeralis*, mouth of adult (nestling, fig. 16).

XIII—*On some New Guinea Bird-names.*

By GREGORY M. MATHEWS, M.B.O.U.

AN account of the Birds collected by the British Ornithologists' Union Expedition to New Guinea, written by Mr. Ogilvie-Grant, has recently been published in the Jubilee Supplement No. 2 of this Journal. As a whole, this is a good and full account, and will be extremely useful to later workers when dealing with New Guinea birds. Many of the genera and species there dealt with occur in Australia, and Mr. Ogilvie-Grant has often noted my conclusions regarding Australian forms, generally to disagree with them. I do not propose to trouble the readers of 'The Ibis' with controversial opinions, but I feel it necessary to record how frequently Mr. Ogilvie-Grant has ignored my published notes dealing with facts. It is obvious that Mr. Ogilvie-Grant's paper will be often utilized as a basis for future work, so it is important to point out what rectifications are required at the earliest opportunity. The succeeding notes only deal with such points as have occurred to me while studying my own Australian Avifauna. It is possible that other nomenclatural errors may be found, but I have only concerned myself with those that I myself have come across.

I will take the species in the order given in the paper.

Page 2.

Gymnocorax senex.

Although Mr. Ogilvie-Grant has generally followed Messrs. Rothschild and Hartert, accepting all their mistakes, in this case they wrote (Nov. Zool. vol. xx. 1913, p. 520) *Gymnocorvus senex*.

This paper was issued on October 21, while on October 23, the 'Austral Avian Record,' vol. ii. nos. 2 & 3, appeared. Pages 49-54 contained a paper by myself, entitled "Dates of Publication of the Plates of the 'Ornithology . . . of the Coquille.' " The information in this paper has not been

made use of by Mr. Ogilvie-Grant, as will hereafter be noted. With regard to the present species, I quote my own words (p. 54):—" . . . In the Bull. Sci. Nat. Férussac, vol. x. 1827, p. 291. Lesson and Garnot described *Corvus tristis* (Atlas Zool. pl. 24)." The plate appeared with the name *Corvus senex*, and this name is used in the text of the 'Coquille.' In the Cat. Birds Brit. Mus. this species appears as a monotypic generic form, under the name *Gymnocorax senex*. I do not see that *Corvus tristis* is pre-occupied, so that the name of the species should be *tristis*. It is also necessary to revert to the genus *Gymnocorvus*, as *Gymnocorax* is simply a classical emendation. The species should therefore be known as

GYMNOCORVUS TRISTIS.

As a matter for inquiry, if emendations were admissible, which they are not, would it not be the secondary item of the compound that should be altered, not the primary constituent?

Page 4. Phonygamus keraudreni.

This name is correct, so far as I know, but the second reference needs rectification. It is given "*Phonygama keraudrenii*, Less. & Garn. Voy. 'Coquille,' Ois. i. p. 636, pl. xiii. (1826)."

In the paper I have just quoted I showed that the plate entitled "*Barita keraudrenii*" appeared in the first livraison, which was published in 1826; p. 636, however, did not appear until January 9, 1830. I am purposely confining these remarks to their most scant degree, and omitting all the surrounding items, which I have generally already published in detail elsewhere. By this means I hope to emphasize the essential fact with the wish that it will not be again overlooked.

Page 45. Oriolus striatus.

It appears this bird wants a new name. Mr. Ogilvie-Grant gives no primary reference, referring to the Cat. Birds, iii.,

published forty years ago, and then to Rothschild & Hartert, N. Z. x. p. 111 (1903), xx. p. 526 (1913). At the latter reference Rothschild & Hartert cite the species thus:—

“*Oriolus striatus* Quoy et Gaimard, Voy. ‘Astrolabe,’ i. 1830, p. 195, pl. ix. fig. 2 : Dorey, New Guinea.”

This species was placed in *Mimeta* by Salvadori. *Mimeta* was founded on Latham’s *Coracias sagittata*, as a synonym of which stands *Coracias striata* Shaw. This name invalidates that given by Quoy and Gaimard, and for their *Oriolus striatus* I propose

MIMETA GRANTI, nom. nov.

Page 63.

Ptilotis.

This generic name is used for a long series of species, which are certainly heterogeneous. Moreover, the name is very doubtfully applicable to any one of them. In the ‘Austral Avian Record,’ vol. i. p. 184, published March 20, 1913, I gave a note on “The Genus-name *Meliphaga*,” and there I showed that the type of *Meliphaga* Lewin was identical with the type of *Ptilotis* Swainson and antedated it. In my ‘List of the Birds of Australia’ I utilized (p. 273) *Meliphaga* to replace *Ptilotis*. No contravention (that I know of) of my facts has appeared.

Later, in the same Journal, vol. ii. p. 111, September 24, 1914, I proposed *Dorothina* as a new name for *Meliphaga* Lewin, on account of the prior *Melophagus* Latreille in Sonnini’s Buffon Ins. vol. iii. p. 466 (1802).

It would have been interesting to read Mr. Ogilvie-Grant’s comments on my notes, as in the B. O. U. ‘List of British Birds’ such items were variously dealt with, and no consistent procedure was attempted. Consequently, I cannot guess whether my conclusions, had they been noticed, would have been accepted or rejected.

Page 72.

Ptilotis chrysotis saturator.

The specific name cannot be maintained, as the type of “*Ptilotis*” was called *Meliphaga chrysotis* by Lewin. As a

matter of fact, Lesson himself, the author of the second "*chrysotis*," corrected his error, naming the bird *Myzantha flaviventer* in the 'Manuel d'Ornith.' vol. ii. 1828, p. 67. Moreover, the name appeared simultaneously with the invalid name on the plate only, while the text covering the species in the Voy. 'Coquille' was not published until two years later.

The most applicable name is that utilized by me in my 'List of the Birds of Australia,' 1913, p. 282, viz. :—

XANTHOTIS FLAVIVENTER.

The subspecific name, *saturator*, is probably correct.

Page 139. Monarcha chalybeocephalus.

Mr. Ogilvie-Grant has given a note concerning this name :—"This species was first described from New Ireland under the above name [Garnot, Voy. 'Coquille,' i. p. 589, pl. xv. fig. 1 (1826)], and subsequently as *Drymophila alecto* from Celebes [Temminck, Pl. Col. pl. 430. fig. 1 (1827)]." Had the article on the Voy. 'Coquille' been consulted, this erroneous statement would not have been promulgated.

In that paper I showed that plate xv. did not appear until late in 1828, while p. 589 of the text was not issued until late in 1829. As Temminck's name was published in 1827, it has clear priority and the name to be used should be

PIEZORHYNCHUS ALECTO,

as given in my 'List of Birds of Australia,' 1913, p. 190.

Though the generic name *Monarcha* is considered the most suitable by Mr. Ogilvie-Grant, Australian field-ornithologists, from study of the birds themselves, have preferred the one I give.

Page 145. Myiagra latirostris mimikæ.

In the 'Austral Avian Record,' vol. ii. pp. 95-96, September 24, 1914, I detailed the history of Gould's *M. latirostris*, and may briefly note the facts.

Vieillot described a *Platyrrhynchos ruficollis*, and this has been recognized by Berlepsch and Hellmayr. Swainson described Vieillot's type as *Myiagra latirostris* in 1838, and two years later Gould described the Australian bird under the same name. This latter usage is the one continued by Ogilvie-Grant, but it is obviously untenable.

The name to be used for the New Guinea bird, then, is

MYIAGRA RUFICOLLIS MIMIKÆ.

Page 177.

Pitta atricapilla.

Ogilvie-Grant observed: "There can be no doubt that *Pitta atricapilla* Quoy & Gaimard is the oldest name for this bird."

The specific name had, however, been previously used for a member of the same genus, and consequently Quoy and Gaimard's usage is invalid, and therefore reversion must be made to

PITTA NOVÆGUINÆ.

Page 224.

Lorius.

Since Mr. Ogilvie-Grant's paper was prepared, an inquiry into the names proposed in Boddaert's 'Table des Planches Enlum.' by Iredale and myself, has been published in the 'Austral Avian Record,' vol. iii. pp. 31-51, Nov. 19, 1915. I do not regard this name as a mistake by Mr. Ogilvie-Grant, but I am drawing attention to the facts here as so many of my nomenclatural notes have been overlooked by him.

We there recorded that *Lorius* (mis-spelt *Larius*) was introduced by Boddaert in connection with *Psittacus ceclanensis*, p. 42, and, as this name is a synonym of *Psittacus roratus* Müller, 1776, given to the same plate, *Lorius* is equal to *Eclectus*.

For the genus Ogilvie-Grant is dealing with, Wagler's well-known

DOMICELLA

is available.

Page 237.

Cyclopsittacus.

It seems strange that in this case Ogilvie-Grant has disagreed with Rothschild and Hartert, as in the *Nov. Zool.* vol. xx. 1913, p. 485, they correctly used

OPOPSITTA.

This was due to my initiative, as I examined the basis of *Cyclopsitta* Reichenbach and recorded the result in the *Nov. Zool.* vol. xviii. 1912, p. 261. The writers quoted examined my data and found them to be correct. It may be objected that I write strongly, but this is necessary in view of the very important position held by Mr. Ogilvie-Grant: his actions, right or wrong, are liable to prejudice workers, unable to consider technical matters for themselves, and, consequently, he should be specially careful.

Page 240.

Solenoglossus.

Though Ogilvie-Grant has used this name to replace *Microglossus* auct., as determined by myself some years ago (*Nov. Zool.* vol. xviii. 1911, p. 11), a reconsideration is necessary, and I will fully discuss the matter in my 'Birds of Australia,' the part dealing with these birds being now in preparation. Again, though the date of publication of Vieillot's *Microglossus* is given "(*fide* C. D. Sherborn)," this had been published by me in the 'Austral Avian Record,' vol. ii. 1915, pp. 153-158.

Further, on p. 241, Ogilvie-Grant has written "*Solenoglossus aterrimus* (Gmel.) [Type-locality, New Holland = Cape York]," adding "Mr. Mathews . . . renamed the Queensland bird *Solenoglossus aterrimus macgillivrayi*, but, as shown, this is a pure synonym of *S. aterrimus* (Gmel.)."

If Mr. Ogilvie-Grant had been a diligent reader of 'The Ibis,' as well as a compendious contributor, he would not have erred in this matter, as in that Journal for January 1915 (p. 79) I gave the true facts of the "New Holland" citation by Gmelin. I am only dealing with facts in this place, and will fully debate all the points raised by

Mr. Ogilvie-Grant, and also Rothschild and Hartert, whose conclusions have been accepted, in my 'Birds of Australia.'

At the present time, the undoubted fact is that my name must be used for the Australian form, and consequently Ogilvie-Grant's nomenclature, so far as that is concerned, is wrong. If Rothschild and Hartert be right, which I doubt, then the name of the bird Ogilvie-Grant is dealing with is

SOLENOGLOSSUS ATERRIMUS ATERRIMUS.

Page 242.

Cacatua.

Ogilvie-Grant has continued the usage of this name for the genus I call *Cacatoes*. I here give the synonymy of the generic names, which shows what a poor claim Ogilvie-Grant's selection has. I will fully discuss the matter in my 'Birds of Australia,' as the matter is very complex and cannot be stated shortly here.

? *Kakadoe* Cuvier, 1798-1800.

Cacatoes Duméril, 1806.

Catacus Rafinesque, 1815.

Plyctolophus Vieillot, 1816.

Cacatua Vieillot, 1817.

It is certain that whatever the ultimate designation of this many-named genus may be, it will not be the last-named. At present, and probably correctly, I use

CACATOES.

Page 245.

Dasyptilus pesqueti.

This name has apparently been accepted because Rothschild and Hartert used it in the Nov. Zool. vol. xx. 1913, p. 486. In the same journal, two years previously, I had written (vol. xviii. 1911, p. 13):—

"It is of interest to point out that *Dasyptilus* of Wagler (*loc. cit.* p. 502) is retained in the Cat. Birds, xx. p. 385, in preference to *Psittrichas* Lesson, while, when Wagler introduced his genus, he pointed out that he had been anticipated in publication by Lesson with *Psittrichas*, and it is this note that gives us some idea of the date of publication of

Wagler's paper." As a synonym of *Psittacus pecquetii* Less. (Bull. des Sci. Nat. xxv. p. 241, Juin 1831), Salvadori quotes *Banksianus fulgidus* Lesson, *Traité d'Orn.* p. 181, 1831 (type examined). I have shown that this part of the 'Traité d'Orn.' was published in 1830; hence a double change is necessary, and the bird called *Dasyptilus pecquetii* Lesson must bear the name

PSITTRICHAS FULGIDUS LESSON.

I overlooked the fact that Oberholser had previously noted the anterior publication of *Psittrichas*, but he did not observe the complex of the specific name.

However, it will be seen that recent writers on New Guinea birds have overlooked both Oberholser and myself.

Page 246.

Eclectus.

As indicated (*ante*, p. 299) under the name *Lorius*, this name will displace *Eclectus*. I have also stated this does not affect me greatly, as there is a prior *Eclectis*, which seems in this case to endanger the name at present used. Therefore it can easily be remedied by the usage of

LORIUS.

Page 249.

Ptistes.

As long ago as 1911 I discussed the status of the generic names *Aprosmictus* and *Ptistes* in the Nov. Zool. vol. xviii. p. 13. Apparently because Rothschild and Hartert overlooked my review and incorrectly used *Aprosmictus* in the Nov. Zool. vol. xx. 1913, p. 487, Ogilvie-Grant has followed suit.

Briefly the matter can be restated thus: Gould proposed *Aprosmictus* for two "types" in 1842. Gray, in 1855, fixed one of these absolutely as type. Against this action there is no appeal. In 1865, Gould himself split up the two species into two genera, and confusedly brought in the new name *Ptistes* for the species Gray had determined as type of *Aprosmictus*. This was a bad mistake, but it was accepted in the Cat. Birds, though it was known to be wrong, and now Ogilvie-Grant has continued the misusage.

Therefore, the species called *Ptistes erythropterus coccineopterus*, following van Oort, must be called

APROSMICTUS ERYTHROPTERUS COCCINEOPTERUS,

though I much doubt the subspecific name. The other bird, which is called *Aprosmictus callopterus wilhelminæ* by Ogilvie-Grant, and also by Rothschild and Hartert, should bear the name

ALISTERUS CALLOPTERUS WILHELMINÆ,

if it be accepted that the species is congeneric with *A. cyanopygius* (Vieillot).

On p. 251 the name would be

ALISTERUS DORSALIS,

under the same conditions.

Page 267. Haliastur indus girrenera.

As long ago as 1911 I indicated the misuse of the subspecific name "*girrenera*," writing (Nov. Zool. vol. xviii. p. 10) "Vieillot (Galerie d'Ois. i. pl. x. 1820) proposed *Haliaëtus girrenera* simply as a new name for the bird described as *Falco pondicerianus* Gmelin, and therefore advocated Gould's name."

Rothschild and Hartert have disputed this conclusion, but it seems their reasons were not duly considered, as the facts are very clear. However, Ogilvie-Grant does not quote these writers as his authority for his use of the name, and, as he does not generally quote primary references, I do not know whether he has referred to Vieillot's work. The correct name is

HALIASTUR INDUS LEUCOSTERNUS.

Page 268. Baza subcristata.

The remarks regarding the forms of this species may be correct, and show that a careful criticism of the birds was made. Had the same care been bestowed upon the generic name a change would have been made. In my 'Birds of

Australia' now printed, I have given the results of an investigation into this matter, and would note that true *Baza* seems easily generically separable from this species. If, however, the complex genus usually accepted under this name be continued, then *Baza* cannot be maintained, as it is of later date than *Aviceda*, one of the names usually ranked as a synonym. This was given to an African group which, moreover, resembles the above species more than typical *Baza*. For the present species I use

LOPHASTUR.

Page 275.

Ibis molucca.

I have shown that the correct generic name is *Threskiornis*, the details being published in the 'Auk,' vol. xxx. 1913, pp. 92-95. Mr. Ogilvie-Grant cannot claim to have been unaware of this, as on p. 276 he refers to the place (Birds Austr. iii. 1914, p. 378) where I used *Threskiornis* for the present species. I also gave anew a sketch of the 'Auk' paper, but, as Mr. Ogilvie-Grant even misquotes my remarks, it is probable that he did not read the previous notes.

Page 276.

Notophoxyx picata.

Ogilvie-Grant has written "*N. aruensis* Gray is said to be the immature of *N. picata*, but this has been denied by Sharpe."

In the 'Birds of Australia,' vol. iii. 1914, p. 447, I wrote: "The immature spoken of by Gould as belonging to this species is undoubtedly so." This result was arrived at by the acquisition of Australian specimens showing the plumage-changes.

In any case, the name used by Ogilvie-Grant is wrong, as Gould's name was preoccupied, as pointed out by Sharpe in the Cat. Birds Brit. Mus. vol. xxvi. p. 654, 1898, where he renamed Gould's bird *Notophoxyx flavirostris*. The New Guinea bird would be the same as the Aru Island form, so that the name to be used should be

NOTOPHOYX ARUENSIS.

Page 280.

Hydralector.

Ogilvie-Grant discusses the forms of the species formerly known as *H. gallinaceus*, and his conclusions regarding subspecies may be questioned. His usage of *Hydralector* is, however, unquestionably wrong. He has quoted my *Birds Austr.* iii. p. 316, under a name *I did not use*. On p. 314 I restated the case for *Irediparra*, a name which I proposed for this species in the *Nov. Zool.* vol. xviii. 1911, p. 7. My arguments have been criticised by careful workers, such as Hellmayr, and have been accepted. The correct name is

IREDIPARRA.

Page 301.

Carpophaga.

Years ago Richmond pointed out that this name was absolutely preoccupied by Billberg. As a matter of fact, under British usage, it had been continually invalid, as there was a prior *Carpophagus* on record all the time. However, Rothschild and Hartert, the most important workers and writers on New Guinea Birds, simply overlooked this correction and continued the misusage. This was not done intentionally, but was a pure oversight. As the result, the name has been persisted in by Hellmayr, Stresemann, Stuart Baker, and now Ogilvie-Grant. I have already indicated this error twice, and this third correction may induce the acceptance of the correct name

MUSCADIVORES.

XIV.—Some Notes in reply to Mr. G. M. Mathews.

By W. R. OGILVIE-GRANT.

THE editor of 'The Ibis' having shown me the criticisms made by Mr. Mathews on certain points in the nomenclature used in my Report on the Birds collected in Dutch New Guinea, I feel bound to offer a few remarks in reply.

However careful one may be, errors creep in and are overlooked. This, alas, is inevitable. We are all glad to have mistakes pointed out and to correct them, when such occur. Mr. Mathews complains that I have frequently ignored his "published notes dealing with facts," but the reason is obvious. Our ideas of what constitutes ornithology unfortunately differ very widely. My object has always been to avoid any change of well-known names unless absolutely necessary, and to avoid the needless multiplication of genera and subspecies. Mr. Mathews, on the other hand, in his 'Birds of Australia,' seems to consider it a solemn duty to change as far as possible all names formerly recognised, to use a different generic name for almost every species, and to introduce endless new names for subspecies—very often imaginary and generally almost uncharacterised. A very large number of generic names, and hundreds of specific and subspecific names, have thus been added to the long list of Australian birds (about 850) since Mr. Mathews first commenced his ornithological studies about the year 1907. He seems annoyed that older ornithologists in this country are not disposed to accept his changes in nomenclature and to approve his methods, which, far from advancing our knowledge of birds, have precisely the opposite effect. Such a system of name-juggling and species-splitting as he adopts can only result in hopeless chaos. This seems a very great pity; for had Mr. Mathews, with his resources and exceptional opportunities, continued his great work on the same lines as he commenced it in his first volume, he would have deserved all praise; but now he seems to have run completely off the rails.

Moreover, there is no finality about his work, for he and Mr. Iredale are constantly changing the names which they themselves have adopted.

Take, for example, the case of the Rock-hopper Penguin, occasionally found on the coasts of Tasmania, *Catarrhactes chrysocome* (Forster) of my Catalogue of Birds B. M. xxvi. p. 635 (1898).

1908. Mathews, Handb. Birds Australia, p. 15; this species appears as *Catarrhactes chrysocome*.
1911. Mathews, Birds of Australia, i. p. 277, names it *Penquinus chrysocome chrysocome* in the text and *Catarrhactes chrysocome* on the plate (65).
1912. Mathews, Nov. Zool. xviii. p. 198. *P. c. chrysocome* is again used.
- April 1913. Mathews & Iredale, Ibis, p. 220, call the species *Eudyptes chrysocome chrysocome*.
- November 1913. Mathews, 'List of the Birds of Australia,' p. 4, substitutes *Eudyptes pachyrhynchus* Gray for *C. chrysocome*, without offering any explanation.

The type of *C. chrysocome* (Forster) came from Tasmania: *C. pachyrhynchus* Gray is from South Island, New Zealand, and the type is in the British Museum. The differences between the two have been fully set forth in my Catalogue, quoted above.

Again, as regards English names. In 'The Ibis,' April 1913, p. 220, the name "Big-crested Penguin" is applied to a third species, *C. sclateri*, while in the 'List of the Birds of Australia' it is referred to *C. pachyrhynchus*, as the author has misnamed *C. chrysocome* from Tasmania! There is only one example of the Rock-hopper Penguin from the Australian Seas in this country, so far as I am aware, and that is one from Tasmania (the type locality of *C. chrysocome* (Forst.)), sent by Prof. W. A. Haswell, of the Macleay Museum, University of Sydney. Mr. Mathews writes that he intends to describe this typical specimen of *C. chrysocome* as a new subspecies in a forthcoming paper, but on what grounds it would be difficult to guess.

p. 2. *Gymnocorax senex*.

It is quite an open question whether *Corvus tristis* Lesson & Garnot [Férussac Bull. Sci. Nat. x. p. 291 (1827)] has

priority over *Corvus senex* Lesson, Voyage 'Coquille,' Ois. i. p. 650, pl. 24. The latter name appears both in the text and on the plate, while the name *C. tristis* is not mentioned: later it is referred to by Lesson in his *Traité d'Orn.* p. 327 (1831), where the genus *Gymnocorvus* was proposed. This hybrid name was subsequently amended by Sundevall, *Av. Tentamen*, p. 44 (1872), to *Gymnocorax*, which has since been almost universally adopted.

To the latin diagnosis of *C. tristis* is added the reference (*Atl. Zool.* pl. 24), which, of course, refers to the 'Voyage of the "Coquille," Atlas.' Plate 24 is an excellent representation of the Bare-faced Crow, and, as pointed out above, bears the name *Corvus senex*. It seems certain that this plate appeared before the description of *C. tristis* was published in 1827, as it is there referred to. The title-page of the Atlas bears the date 1826. Similar evidence is to be found in the description of Quoy's Piping Crow, *Barita quoyi* Lesson, *Férussac Bull. Sci. Nat.* x. p. 289 (1827). After the short latin diagnosis, the reference (*Atl. Zool.* pl. 14) is to be found.

Mr. Mathews (*Austr. Av. Rec.* ii. p. 52) gives the dates of issue of these plates as: plate 24 (1828) and plate 14 (1829), but from the above evidence it seems certain that the Atlas of plates must have been issued previous to 1827—probably in 1826, as stated on the title-page. The name *C. tristis* has never been adopted, and there seems to be no possible object in raking it up now.

p. 4. *Phonygamus keraudreni*.

No remark is necessary: the date, 1830, as determined by Mr. Sherborn, might certainly have been inserted after p. 636, but it seemed hardly necessary.

p. 45. *Oriolus striatus*.

Mr. Mathews proposes to rename this species after myself. *Coracias striata* Shaw, *Gen. Zool.* vii. p. 400 (1809); = *Coracias sagittata* Lath. *Ind. Orn. Suppl.* p. xxvi (1801) [described as the Striated Roller, *Lath. Gen. Syn. Suppl.* ii.

p. 122 (1802) New South Wales] ; = *Gracula viridis* Lath. Ind. Orn. Suppl. p. xxviii (1801) [described as Green Grackle, Lath. Gen. Syn. Suppl. ii. p. 129 (1802) New Holland] ; = *Oriolus viridis* Sharpe, Cat. Birds B. M. iii. p. 212 (1877) Australia.

Shaw almost certainly wrote *Coracias striata* in error for *C. sagittata*, as, a few pages previously (*op. cit.* p. 396), he had already used the same name, *Coracias striata*, for the little Glossy Starling from New Caledonia known as *Aplonis striata* (Gmel.), Sharpe, Cat. Birds B. M. xiii. p. 127 (1890). *Coracias striata* Shaw, p. 400, is, of course, invalidated by *C. striata*, p. 396.

Oriolus striatus Quoy & Gaim. Voy. 'Astrolabe,' Zool. i. p. 195, pl. ix. fig. 2 (1830), was given to a different species of Oriole from Dorei, New Guinea, and is, therefore, also invalidated by Shaw's name—a fact which I had overlooked.

p. 63. *Ptilotis*.

The species to be included in this genus, whatever name it may bear, is clearly a matter of opinion. A careful revision of the whole group of Honey-eaters is necessary before this rather difficult question can be settled. Meanwhile, I have adopted the name commonly in use.

p. 72. *Ptilotis chrysotis saturationis*.

Meliphaga chrysotis Lewin, from Australia, is a quite different bird, generically and specifically, from *Philedon chrysotis* Lesson, Voyage 'Coquille,' Atlas, pl. xxi. bis (1826). Lesson, it is true, afterwards [Man. d'Orn. ii. p. 67 (1828)] changed the name of his bird to *Myzantha flaviventer*, because the name *chrysotis* had been given to another species of Honey-eater (*philedon*) ; but, for the reason given above, his former specific name should stand, even if the generic name has to be changed.

p. 139. *Monarcha chalybeocephalus*.

The same argument put forward under *Gymnocorax senex* applies to this species. There seems to be no reason to

believe that the Atlas of the Voyage of the 'Coquille' did not appear in 1826 as stated on the title-page. In that case, the name *Muscicapa chalybeocephalus* has priority over *Drymophila alecto* Temm. This view was taken by G. R. Gray and Count Salvadori.

p. 145. *Myiagra latirostris mimikæ*.

Mr. Mathews, no doubt rightly, follows Count Salvadori, Orn. Pap. ii. p. 77 (1881), in calling the Australian species *M. ruficollis* Vieillot, N. Dict. d'Hist. Nat. xxvii. p. 13 (1818). Vieillot gives "Nouvelle Hollande" as the locality, which, for some reason, Mr. Mathews has changed to Timor, Austr. Av. Rec. ii. p. 96 (1914), though, in the 'List of the Birds of Australia,' p. 187 (1913), he gives the locality as New South Wales! He was thus able to uphold his *Myiagra ruficollis cooperi* from Melville Island, which he admits is synonymous with Gould's *M. latirostris* from Port Essington, and therefore with *M. ruficollis*. A similar instance occurs in the case of *Solenoglossus aterrimus* (Gmel.), *vide infra*.

p. 177. *Pitta atricapilla*.

Pitta atricapilla, the name given by Quoy & Gaimard to the New Guinea species, was published in 1830. *Pitta atricapilla* Lesson, for the Philippine species, was almost certainly published in 1831. It appeared on p. 394 of the 5th Livr. of the *Traité d'Orn.* Mr. C. D. Sherborn has a note that the 5th Livr. was issued at the end of 1830 or the beginning of 1831, but as it was not announced in the *Bibl. Fr.* till March 1831, we may safely infer that it did not appear till the later date.

p. 224. *Lorius*.

There are the strongest objections to transferring this well-known name to *Eclectus*, as it would create great confusion. In any case, the name written by Boddaert was *Lorius*, and I am surprised that Mr. Mathews should suggest changing it, though it is obviously a misprint for *Lorius*.

p. 237. *Cyclopsittacus*.

I have carefully considered Reichenbach's plate lxxxii. Syst. Av. (1850), and disagree with Mr. Mathews's conclusions. The drawings are, perhaps, not very good, but sufficiently so, and have been accepted by Count Salvadori. *Opopsitta* Sclater, P.Z.S. 1860, p. 227, was introduced without description, and was most likely a printer's error overlooked by the author, as, on p. 224, he uses the name *Cyclopsitta* in referring to the Philippine species, *Psittacus lunulatus* Scop. The Philippine species were afterwards placed in a separate genus, *Bolbopsittacus*, by Count Salvadori.

p. 240. *Solenoglossus*.

That this name has priority over *Microglossus* was pointed out by Count Salvadori, Cat. Birds B. M. xx. p. 102 (1891), but, for the reason there stated, he did not make use of it. Mr. Mathews's notes on the matter appeared in 1911! There can be no question that Gmelin *did* give "New Holland" as the locality of his *Psittacus aterrimus*, and that a Black Cockatoo *does* occur in Queensland. There is, therefore, no getting away from the fact that *Solenoglossus aterrimus* (Gmel.) is the proper name for the Australian form, and that *S. a. macgillivrayi* is synonymous.

p. 242. *Cacatua*.

The reasons for using the name *Cacatua* are explained by Count Salvadori, Cat. Birds B. M. xx. p. 115 (footnote).

p. 245. *Dasyptilus pesqueti*.

The synonymy appears to be:—

Banksianus fulgidus Less. Traité d'Orn. livr. 3, p. 181 (July 1830), fide C. D. Sherborn.

Psittichas pecquetii Less., Férussac Bull. Sci. Nat. xxv. p. 241 (read p. 341) (June 1831).

Dasyptilus pecqueti Wagler, Monogr. Psitt., Abh. Akad. Wissensch. München, 1829-30, pp. 502, 681, 735 (1832?). The preface to this monograph is dated [p. 468] 1830: the title-page bears the date 1832.

Dasyptilus pesqueti has been accepted by G. R. Gray (a most careful bibliographer), by Count Salvadori, and by the great majority of authors.

The name *pecqueti* is a misprint for *pesqueti*, and was subsequently altered by Lesson, Ill. de Zool. pl. i. (1832). He there explains that he received the bird from M. Pesquet.

p. 246. *Eclectus*.

Vide supra. Note on *Lorius*.

p. 249. *Ptistes*.

In using this generic name I have accepted Count Salvadori's view. Gould (P. Z. S. 1842, p. 112), the author of *Aprosmictus*, included as the types two species, *A. scapulatus* (= *cyanopygius*) and *A. erythropterus*. Subsequently (Handbook B. Austr. ii. p. 37, 1865) he placed the latter species in a new genus—*Ptistes*. G. R. Gray (Cat. Gen. Birds, 1855, p. 86) gives no reason for adopting *A. erythropterus* as the typical species of *Aprosmictus*, and I therefore uphold the original describer's subsequent choice of a type.

p. 267. *Haliastur indus girrenera*.

No remark seems necessary. I do not quote "primary references" when I consider them superfluous.

p. 268. *Baza subcristata*.

This, again, seems to be merely a question of splitting-up the species generally included in *Baza* into other genera. No data for such changes are supplied, nor have they been published.

p. 275. *Ibis molucca*.

There are the strongest objections to the transfer of the well-known name *Ibis*, and the consequent confusion.

p. 276. *Notophox picata*.

I had overlooked the fact that Sharpe had renamed this species *N. flavirostris*, Cat. Birds B. M. xxvi. addenda, p. 654 (1898),

p. 280. *Hydralector*.

Metopidius Wagl. Isis, 1832, p. 279, included *Parra africana* Lath. and *P. ænea*, Cuv.

Hydralector Wagen, Isis, 1832, p. 280, included *Parra cristata* Vieill. and *P. gallinacea*, Temm.

In 1840 Gray indicated *P. ænea* Cuv. as the type of *Metopidius*. *P. ænea* (Cuv. 1817) = *P. cristata* (Vieill. 1817) = *P. indicus* (Lath. 1790). His assignment of a synonym of *P. ænea* as the type of *Hydralector* was, of course, a mistake and must be disregarded. The species *P. cristata* Vieill. thus disappears from the genus *Hydralector*, leaving *P. gallinacea* Temm. as the type. Mr. Mathews's name *Irediparra* is a mere synonym of *Hydralector*.

Sharpe subsequently proposed *Phyllopezus* [Cat. Birds B.M. xxiv. p. 76 (1896)] as a new generic name for *P. africana*.

The number of genera made for the Jacanas might probably be reduced with advantage.

p. 301. *Carpophaga*.

Carpophaga Billberg, Synopsis, Faun. Scand. i. pt. 2, Table A (1828), is a name proposed for the genus of Cuckoos known as *Phœnicophæus* Vieill. I have not considered it necessary to support this change, which has not been accepted except by one or two persons.

XV.—*Studies on the Charadriiformes*.—IV. *An Additional Note on the Sheath-bills: Some Points in the Osteology of the Skull of an Embryo of Chionarchus "minor" from Kerguelen*.—V. *Some Notes on the Crab-Plover (Dromas ardeola Paykull)*. By PERCY R. LOWE, M.B., M.B.O.U.

(Text-figures 7-11.)

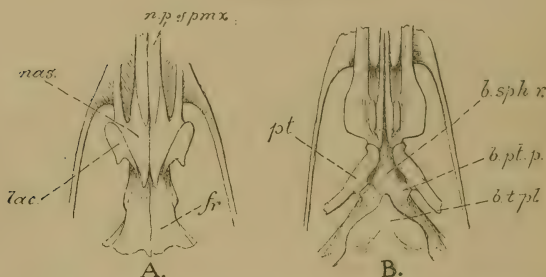
IV. THE SKULL OF AN EMBRYO OF *Chionarchus* "minor."

During the preparation of my paper on the Sheath-bills, published in the January number of 'The Ibis' for 1916 (pp. 122-155), I had unfortunately no time to make a

dissection of one of the embryos of *Chionarchus* taken on Kerguelen during the voyage of the 'Challenger' in 1874. I have since been able to do this, and the results as regards two points, at least, in regard to the osteology of the skull seem to be sufficiently interesting as to be worthy of record.

The exact age of the embryo selected is, of course, impossible to determine; but, as far as I could judge, it was not much more than half-developed towards the point of hatching. At any rate, it was considerably smaller than other embryos taken from the egg.

Text-figure 7.



Portion of the skull of an embryo *Chionarchus* "minor" from Kerguelen.

A. From above.

B. From below.

fr., frontals; *lac.*, lacrymals; *nas.*, nasals; *n.p. of pmx.*, nasal process of premaxillæ; *b.sph.r.*, basisphenoidal rostrum; *b.t.pl.*, basi-temporal plate.

(1) After a little careful dissection, the quadrates, pterygoids, and palatine plates were exposed, and the first, and probably the most interesting, point to be discovered was that, *contrary to what obtains in the adult bird*, a very distinct and obvious basiptyergoid process was demonstrated, projecting from either side of the basisphenoidal rostrum. The distal extremities of these two processes were apparently coated with a cartilaginous articular surface, while, corresponding with these two articular surfaces, two very distinct

facets were found seated on the processes from the pterygoids. Both processes from the basisphenoidal rostrum were in contact with the facets on the pterygoids, and in every respect these basipterygoid articulations seemed to be as perfect and complete as in any adult Plover (such as the Golden Plover), in which these articulations persist throughout maturity. It may here be noted that in the Oystercatchers these basipterygoid articulations persist throughout adult life; and this fact, along with others, seems to point to the conclusion that, although the Oystercatchers are in some respects highly specialised, they are not so fundamentally specialised away from the true Plovers (*Charadriidæ*) as some of the more aberrant Plovers, such as the Sheath-bills, Crab-Plovers, Pratincoles, Skuas, Gulls, and Terns. In ordinary words, they do not appear to have extricated themselves from the true Plover group to the same extent as the aberrant types just enumerated, and, so far as one can as yet form an opinion, they must be looked upon as "true Plovers" and classified with the true *Limicolæ* (*Charadriidæ* + *Scolopacidæ*). An alternative view is to regard them as standing at some point between the true *Limicolæ* and the Laro-*Limicolæ* (Sheath-bills, Crab-Plovers, Pratincoles, Skuas, Gulls, Terns, &c.), but very much nearer the former than the latter. The Oystercatchers, indeed, seem to stand in about the same relation to the true Plovers (*Charadriidæ*) as the much-specialised Woodcocks do to such a generalised scolopacine type as the Chatham Island Snipe (*cf.* 'Ibis,' Oct. 1915, pp. 690-716).

(2) In the embryo Sheath-bill (*Chionarchus*) the morphology of the lacrymal and frontal region was found to be both interesting and instructive. Unlike what obtains in the adult Sheath-bill (*cf.* 'Ibis,' 1916, p. 144, and text-figure 3), the superior or orbital portion of the lacrymal in the embryo has the form of a thin lingulate plate of cartilage, which has a free and independent existence laterad of the nasals, and there is not the slightest hint at fusion between the two bones (*cf.* text-figure 7 A).

In the adult Sheath-bill the identity of the lacrymal of

either side is completely lost in the shield-like bony overgrowth which covers the proximal extremities of the nasals (Ibis, 1916, text-figure 3). In the embryo, on the contrary, we get no hint of this shield-like arrangement, nor of the spongy osseous tissue which, as a fact, we know will later on spread inwards to fuse in the middle line with a similar bony growth derived from the other side.

We thus find that the morphological picture presented by the lacrymo-nasal region in the embryo Sheath-bill reflects some primitive generalised or ancestral type, from which we could well imagine that the distinctive form and shape of the lacrymo-nasal region proper to the adult Oyster-catcher, Sheath-bill, Crab-Plover, Skua, or Gull might easily have been evolved.

(3) *Supraorbital Region*.—As regards its more generalised and more simple structure, all that has just been noted in regard to the facial region applies equally to the whole supra-orbital region. It presents a generalised condition from which any of the peculiarities proper to the aberrant "Plover" forms just enumerated might well be elaborated. In some respects, it is not very unlike the condition found in *Squatarola*. The "notch," for instance, just caudad of the lacrymals was not much more evident than it is in that genus. In the adult Sheath-bill this notch is conspicuous. It may or may not be connected by a bridge of bone so as to form a fenestrum (*cf.* 'Ibis,' 1916, p. 142), and the fact that it is only just indicated in the embryo is what might have been expected.

As regards the supraorbital gland, this is situated along quite the outer fringe of the supraorbital margin, and there is no very obvious groove corresponding to it. It would appear, therefore, that as the gland increases in size with maturity, so the supraorbital grooves grow deeper, wider, and more defined; and this, again, goes to suggest that these grooves, which are so conspicuous in the adult Sheath-bill and the aberrant Plovers already referred to, have but very little significance from the point of view of phylogeny. The gland apparently has grown to such large proportions in

the adult because the birds possessing it are exposed to the same influence of salt water to a greater degree than the generality of Waders.

When going through the osteology of the Ducks, I noted the fact that most, if not all, sea Ducks had large supra-orbital depressions and consequently large supraorbital glands. In fresh-water Ducks the grooves were quite inconspicuous. Subsequently I found that Mr. Pycraft had noted the same interesting fact. It seems reasonable to conclude that the internal secretion of these glands may counteract in some way the adverse effect which salt water might have on the bird's plumage.

(4) In the adult Sheath-bill the antorbital plates are non-existent, or, at least, only the smallest relic of them ossifies and remains evident. In the embryo they are represented by a quadrangular plate of cartilage, which, in form and shape, as well as in its relations to the descending process of the lacrymal, is quite characteristically pluvialine.

The manner in which the descending process of the lacrymal joins the antorbital plate in the embryo is also quite pluvialine.

Summary.—All these points, in as far as they go, confirm the belief assumed in my paper on the Sheath-bills that these birds are pluvialine.

V. SOME NOTES ON THE CRAB-POLOVER

(*Dromas ardeola* Paykull).

Dromas is such a peculiar and aberrant Charadriiform type that any fresh crumbs of knowledge that can be gleaned about it seem worth noting. If there is anything in this paper worth recording, it is entirely due to the trouble which Dr. Drake Brockman took in procuring for me, through Mr. Bethel, an adult bird and two nestlings from the Somaliland Protectorate. These were preserved in spirit, and arrived in England in excellent condition. Although the process*

* A small hole is punctured exactly in the mid-line of the abdomen; the birds are immersed in spirit for one or two days, then taken out and wrapped in rags soaked in spirit, and then packed in a biscuit-tin, the lid of which is soldered down.

of forwarding specimens of this nature is in reality comparatively simple, one is anxious to make full acknowledgment of the trouble taken by Dr. Brockman and Mr. Bethel, and all the more so that one fully realises the difficulty there usually is in getting little jobs of this description undertaken, whereby many of the minutiae of scientific investigation are disappointingly held up. In this connection, I was very anxious to ascertain if, in the chick of *Dromas*, the basipterygoid processes and their corresponding facets on the pterygoids would be evident, although there is no trace of them in the adult. Investigation proved beyond doubt that they are present (see below under "Skull of Chick," p. 335); but had it not been for the trouble taken by Dr. Brockman, this small, though highly interesting, addition to the sum of our knowledge of evolution might still have long remained a secret.

Geographical Distribution.—In the 'Catalogue of Birds of the British Museum,' vol. xxiv. p. 29, the distribution of the Crab-Plover is thus stated: "Shores of Eastern Africa and Madagascar, north to the Red Sea and Arabia, thence east along shores of the Indian Ocean to South India and Ceylon, as well as the Andaman and Nicobar Islands"; to this statement I have nothing to add.

Life-History.—As the complete record of the Crab-Plover's life-history, as far as it is known, is scattered among many communications upon the subject, it may be worth while to reproduce here a short *résumé* of its habits. The Crab-Plover seems to be a purely littoral species, and throughout its range is only very locally migratory. It appears to be only met with where the shores are sandy, or where arid stretches of wind-blown sand or of coral and shell-débris form a somewhat cheerless fringe to the ocean. Along such sun-baked stretches of sandy littoral the Crab-Plover is met with in small flocks of about eight to ten birds. It lives upon molluscs and crustaceans, its large and compressed cone-like bill forming a trenchant weapon with which to deal with this sort of prey. The Crab-Plover can run quickly, and, curiously enough, its flight reminded

Captain Butler ('Stray Feathers,' vol. v. 1877, pp. 212, 232) of that of the Jacana (*Metopidius*). Jacanas, as known to me (*Parra*), fly moderately fast and usually fairly close to the water or marsh over which they are passing. The flight is straight and deliberate, the legs are trailed out behind after the manner of Stilts, and the wings are beaten rapidly or at times held motionless, so that the bird glides on for a space. In a word, the flight of *Parra*—and I have seen scores of these birds flying—is very far from being typical of a normal Plover. The Crab-Plover is said to be a restive bird, with a raucous cry somewhat like that of a Crow. As is well known, the Crab-Plover lays but one egg, which is both large and white, with no markings. This egg is deposited at the end of a narrow tunnel in the side of a sloping sand-bank, sand-dune, or deposit of coral or shell-débris. No attempt at a nest is made. The burrow is about four feet long, and is curved either to the right or left in a bow-shaped fashion. The passage is narrow, and about a foot beneath the surface, while the entrance to it is usually near or under a tussock of grass or some shrubby plant. Baron von Henglin (Orn. Nordost-Afrika, p. 1045) raised the question whether the Crab-Plover actually makes this burrow itself or occupies one previously excavated by a sand-crab. He says that in the flat and lonely coral islets of the Red Sea, where Crab-Plovers breed, great numbers of crabs of various species live in holes tunnelled obliquely through the thick layers of sand and shelly débris. The burrows occupied by the Crab-Plover are precisely similar, and he says: "Whether they excavate them themselves or take possession of crab-holes I cannot positively say, but, in view of their very small diameter, we may assume that they were originally crab-burrows."

Hume ('Nests and Eggs of Indian Birds'), referring to the breeding-habits of this Plover, says: "It would seem that the Crab-Plover begins to lay at the end of April or very early in May, and that by the middle of July the young have not yet permanently left the nest-holes, but are still found in these during, at any rate, the daytime. Whether

they (the young) come out to feed is still doubtful." Dr. Brockman informs me (*in litt.*) that he knows that the birds in Somaliland breed in May and June, and that the specimens of the young chicks sent to me must have been taken at the end of June or early in July. Hume (*l. c.*) goes on to say that the young "seem to be able to run well within ten days of hatching," so that the question arises, why should the young remain so long in the burrow? Von Heuglin says that they do not leave the nest for a long time, although they are well able to run. He also says that they were obviously blinded by the light, "cheeped" like young chickens, and would run as fast as possible to any broken rocks or fragments of stone to take refuge in the shade. Von Heuglin also expressly states that on the Red Sea islets marauding enemies practically do not exist, but he, curiously enough, overlooked the land-crabs. In tropical latitudes, land-crabs wage a murderous warfare on the young of Terns, Gulls, and Waders, and it appears to me highly probable that this enforced sojourn in the burrow on the part of the young, or, indeed, the laying of the egg at all in such a burrow, may have been induced by the danger from the multitudes of these rapacious crustaceans. It may be asked, what is to prevent a land-crab crawling into the burrow after the young? To this I think the answer is, the adult bird, with its trenchant bill, is on guard outside.

Description of Nestling (a few days old).

Above. Down over occipital region, back of neck, mantle, and wings smoky grey, considerably darker over rump. Over the vertex and in the loreal, auricular, and circumorbital regions it is dark sooty grey.

Below. The chin and foreneck are dirty white, breast and abdomen white. Across the lower part of the neck, or the upper pectoral region, there is a faint indication of a dark band caused by the filiform endings of the downy feathers being of a dark sooty-grey coloration.

Bill. Mandibles dark horn-colour, nearly black. Gape extending backwards to a spot immediately below the inner

canthus of the eye. General shape of bill unlike that of adult—more typically pluvialine. Inside of mouth pale yellow; tongue without spots or markings.

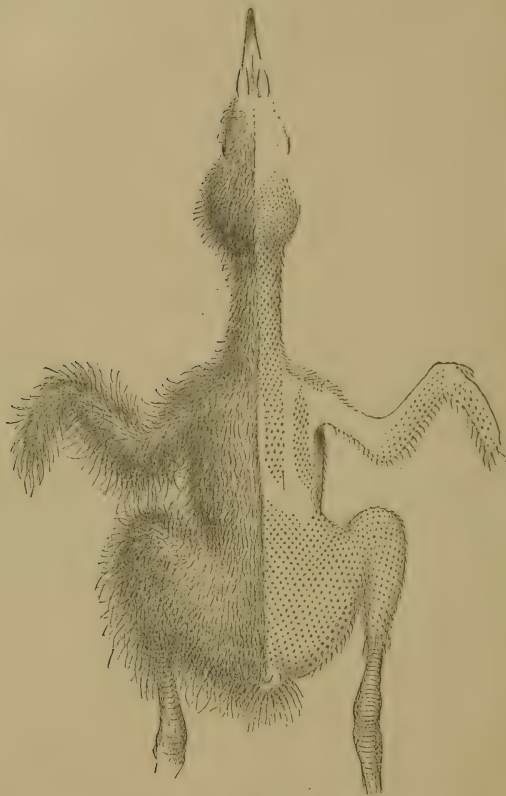
Feet and legs. Slaty blue; scaling of podotheca exactly similar to that of the adult; webbing as in the adult.

Pterylosis.

The accompanying drawing (text-figure 8) depicts the feather-tracts of a young Crab-Plover a few days old, as viewed from the dorsal aspect. Beyond calling attention to the strength of the crural tract, which is sufficiently obvious in the figure, a detailed description seems unnecessary.

A drawing which I made of the feather-tracts of the adult Crab-Plover, so kindly sent to me by Dr. Brockman, is practically identical in detail with the figure of the young Crab-Plover here reproduced, but the feathers of the anterior dorsal tract are degenerate from the vertex of the skull backwards to a point about an inch distad of the bifurcation of the tract in the interscapular region. From this point to the termination of each bifurcation the spinal tract is very strong. The crural tract in the adult is also conspicuously strong and in marked contrast to the degenerate feathers of the posterior portion of the dorsal tract. This posterior portion of the dorsal tract, or to give it the name which I employed in the description of the pterylosis of the embryo Sheath-bill (*cf.* 'Ibis,' Jan. 1916, p. 130)—the dorsi-sacral tract,—is separated from the anterior portion by a distinct break in the feathering of both the young and adult bird (*cf.* text-figure 8), and its anterior extremity is not bifurcated, not even narrowly, as it is in the case of the Sheath-bill (*cf.* 'Ibis,' 1916, p. 131, text-figure 1). In an adult specimen of *Larus argentatus*, whose feather-tracts I have carefully examined and drawn, this posterior portion of the spinal tract (dorsi-sacral) is very deeply and conspicuously cleft. The same condition of things obtained in some young chicks of the Common Tern which I examined. Moreover, in these young Terns the dorsi-sacral tract was quite strong

Text-figure 8.



Dorsal view of a young *Crab-Plover* to show
the feather-tracts.

and ran into the anterior (bifurcated) portion of the spinal tract so as to be almost continuous with it on each side of the mid-line. As far, then, as can be deduced from a comparative study of the pterylosis of the Crab-Plover, in either the chick or the adult, this peculiar Wader appears to have no close relationship to either the Gulls or Terns. Unfortunately I have been unable to compare the feather-tracts of *Dromas* with those of *Recurvirostra*, *Himantopus*, *Hematopus*, *Ædicnemus*, or *Stercorarius*. A study of the pterylosis of the young chick or embryo in any or all of these forms could hardly fail to be of interest. One thing, however, may be stated here with some assurance, viz. that a study of the pterylosis of the Crab-Plover proves that this form is sharply differentiated from the Charadriidæ or the Scolopaciæ.

Osteology.

So far as I have been able to ascertain, we are indebted to J. Van der Hoeven, a Dutch Naturalist, for the only formal paper on the osteology of *Dromas* which is available (Arch. Néerl. des Sci. Exactes et Natur. 1868, tom. iii.-iv. pp. 281-295). In this paper the author expressed his belief that *Dromas* had affinities with *Ædicnemus*; but, strangely enough, he says, in the same paper, that, of all the skulls of birds which he had examined, he found none with more agreement with the skull of *Dromas* than that of *Hematopus*; and he thought that these two genera came very close to one another.

Van der Hoeven, in the same paper, quotes Blyth as having expressed the opinion that *Dromas* was allied to the Terns (*cf.* 'Prodromus Faunæ Zeylanicæ,' by E. F. Kelaart, Colombo, 1852, 8vo; Appendix, pp. 45, 46). Apparently Blyth chiefly formed his opinion on the shape of the bill in the adult and the plumage of the young; but, whatever factors influenced him, he seems to have been as near (or possibly nearer) the truth as Van der Hoeven. In the 'Hand-list of Birds,' vol. i., Sharpe placed *Dromas* in his

suborder Cursorii. In his Address to the International Ornithological Congress ("The Classification of Birds") *Dromas* is included in a distinct suborder, Dromades, of the order Charadriiformes.

The following notes may possibly be the means of throwing additional light on the interesting problem of the affinities of this unique Wader. They are offered more because of the somewhat general nature of Van der Hoeven's remarks than from any belief that the actual secret of the evolution of this form will be more than touched.

The Skull of the Adult.

Occipital Region.—The occipital condyle forms less than a hemisphere and is sessile. The foramen magnum is longer in the antero-posterior diameter than from side to side. In *Hæmatopus* the foramen magnum is rounder, the lateral diameter in some skulls even exceeding the antero-posterior. In the *Œdienemidæ* this foramen is likewise rounder, but the genera vary somewhat in regard to its shape. In *Chionis*, *Larus*, and *Stercorarius* the foramen is not so elongated as in *Dromas*.

Text-figure 9.



Skull of *Dromas* viewed from behind. *tf.*, temporal fossa.

The plane of the foramen magnum in *Dromas* is nearly parallel with the long axis of the skull. Thus the foramen looks nearly directly downwards. In *Hæmatopus* it also looks directly downwards. In the Gulls, Skuas, Sheath-bills, and Stone-Curlews the plane of the foramen is inclined at

various well-marked angles with the plane of the long axis of the skull.

The plane of the whole occipital area in the Gulls, Skuas, and Sheath-bills makes a much smaller angle with the long axis of the skull than it does in *Dromas*. Thus in the Gulls the occipital area looks almost directly backwards. In *Dromas*, *Charadrius*, and *Squatarola* it looks nearly directly downwards.

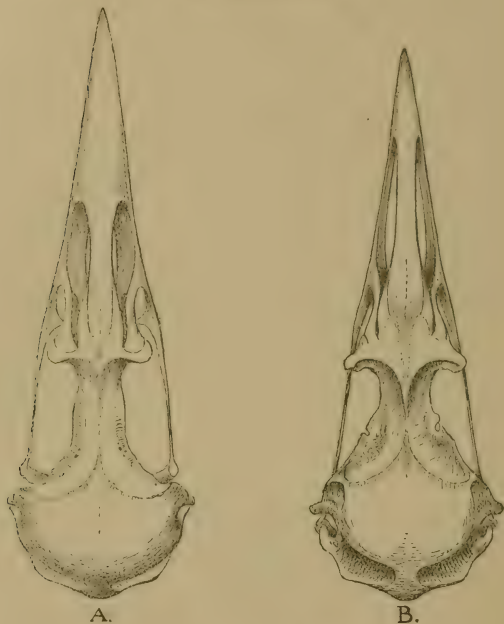
Lambdoidal Ridge.—In *Dromas*, as also in *Larus*, the outer extremity of this ridge bifurcates into two strongly marked divisions, one proceeding forwards to become merged in the squamosal, the other downwards to form the outer border of the paroccipital process. In *Hematopus*, *Edicnemus*, and *Stercorarius* the condition is more pluvialine—that is to say, the lambdoidal ridge swings abruptly round to form the outer border of the paroccipital process, and the squamosal division of the bifurcation is not so strongly marked. *Dromas* therefore, in respect of the lambdoidal ridge and, indeed, of the whole occipital area, as well as the morphology of the squamosal region and the squamosal articulation of the quadrate, is very Larine.

Supra-occipital Foramina.—In *Dromas* these are absent, as they are in the Skuas, Gulls, Terns, Sheath-bills, and Stone-Plovers. In *Hematopus* they are present (or indicated) as they are in the Limicolæ generally.

Cranial Roof.—On a cursory examination, the cranial roof presents a very striking similarity to that of a Gull—the arrangement of the temporal fossæ being, for instance, almost precisely similar to what obtains in *Larus canus* (cf. text-figure 10 B). In *Dromas* these fossæ approach the mid-line even closer than they do in *Larus canus*, being separated by a space of 4 mm. only, whereas in *Larus canus* the intervening space measures 5 mm. In *Hematopus* the temporal grooves fall far short of the mid-line, the arrangement being more pluvialine. In the Stone-Plovers we note a transitional series ranging from a nearly pluvialine condition in *Edicnemus* to a complete larine similarity in *Orthorhamphus magnirostris*.

In the Skuas, as I have previously pointed out ('Ibis,' 1916, p. 140) the arrangement of the temporal grooves is not at all larvae, but is closely similar to what is seen in *Squatarola* or *Pluvialis*, although in *Megalestris* there is a considerable extension towards the mid-region.

Text-figure 10.



Dorsal view of the skulls of
A. *Dromas ardeola*; B. *Larus canus*.

In *Dromas* there is an indication of a sagittal groove down the centre of the fronto-parietal region, much as is seen in *Larus*; but the same condition is to be noted in *Charadrius* and *Hæmatopus*.

The most noticeable feature, however, of the cranial roof is the well-marked supraorbital depressions, which are remarkable for their resemblance to those of *Larus*. The depressions or grooves meet in the mid-line of the interorbital region, a thin sagittal ridge of bone alone separating them (*cf.* text-figure 10).

As in *Larus*, the floor of either groove is perforated towards the hinder margin of the orbital rim by small foramina or fenestra. In the Skuas and Sheath-bills there is a distinct break in the continuity of the curve of the outer edge of the orbital rims in this region, while the fenestra in the floor of the grooves are larger, so that in this respect the Skuas differ from either *Larus* or *Dromas*.

As compared with *Larus*, the interorbital space in *Dromas* is more elongated, but otherwise there are no essential differences, and we may even observe in the two forms a faithful reproduction of the curious ear-shaped processes of bone in which the orbital margins of either side terminate as they approach the postorbital processes. In the form and structural details of this interorbital region *Hematopus* is, of course, also notoriously *larine*—that is to say, it is similar in this respect to *Larus canus*.

Lacrymals.—Still proceeding forwards, we arrive at the lacrymals, and here, for the first time, we note any very obvious morphological differences between the skulls of *Dromas* and *Larus*.

In *Larus* the orbital portion of the lacrymal is produced outwards and backwards as a free and prominent process (*cf.* text-figure 10). In *Dromas* the orbital portion of the lacrymal has no such free process. On the contrary, it is at first directed abruptly outwards at right angles to the long axis of the skull, and then again makes a right-angled turn forwards and downwards, to be continued into the descending process of the lacrymal. In this respect *Dromas* is *pluvialine*.

As regards the descending process of the lacrymal in the two forms, there are certain noticeable differences. In both *Larus* and *Dromas* it is first continued downwards, forwards, and slightly inwards, and then is bent backwards so as to

make an angled knee ; but, whereas in *Dromas* this backwardly-directed or distal extremity has an inward direction, in *Larus* it has an outward. In *Dromas*, too, the angle made by the proximal and distal halves of the descending process of the lacrymal is much less acute than in *Larus*, and, as a consequence, the distal end approaches the ant-orbital plate from above, while in *Larus* it approaches the same structure from well in front (*cf.* text-figure 10). In both forms we find, projecting forwards from the angled knee, a spinous process ; but, whereas in *Dromas* it is thin, sharp, and conspicuous, in *Larus* it is aborted. In all the above-mentioned points the lacrymals of *Dromas* have a modified pluvialine arrangement in contradistinction to a typical larine. In *Hæmatopus* the descending process of the lacrymal makes no such angled knee as described above ; on the contrary, it comes down perpendicularly to fuse with the antorbital plate in the usual pluvialine method.

In both *Dromas* and *Larus* the distal end of the descending lacrymal fuses with the extero-superior angle of the ant-orbital plate of the mesethmoid or with its apex or outer extremity. In the freshly-hatched chick of *Dromas* it fuses with the extero-superior angle.

Fronto-nasal Region.—Corresponding with the differences in the lacrymals in the above forms, we find that there are other distinctions to be noted in the fronto-nasal region. Briefly noted, these are the shorter relative length of the fronto-nasal space in sagittal section in *Dromas* ; the contrast in the method of articulation of the proximal ends of the nasals (text-figure 10) ; the greater length of the nasal vacuity in *Larus* and its different shape.

In both *Larus* and *Dromas* we find a schizorhinal arrangement.

Premaxillæ.—In several respects the upper jaw of *Dromas* is not pluvialine in form. Neither is it larine. It is, however, very similar to the condition of things to be noted in ædicnemine genera. Its palatal surface (text-figure 11), distad of the point from whence its maxillary processes have an independent existence, forms a continuous,

though slightly hollowed bridge from one cutting-edge of the tomium to the other; and in this respect it agrees with all the Stone-Plover genera, but more especially with *Orthorhamphus*.

As in these ædicnemine genera, the palatal surfaces of the maxillary processes of the premaxillæ are flat, broad, and ribbon-like.

In the Charadriidæ, such as *Squatarola* and *Pluvialis*, the palatal surface of the premaxillæ is not bridged in the above fashion, with the result that a distinct groove is left between the tomial edges right up to the very tip of the bill. In the Gulls (*Laridæ*) and Skuas (*Stercorariidæ*) a modification of this bridge is seen which is quite distinctive, while in both the Sheath-bills (*Chionididæ*) and the Oyster-catchers a condition of the hard palate peculiar to either group is again seen.

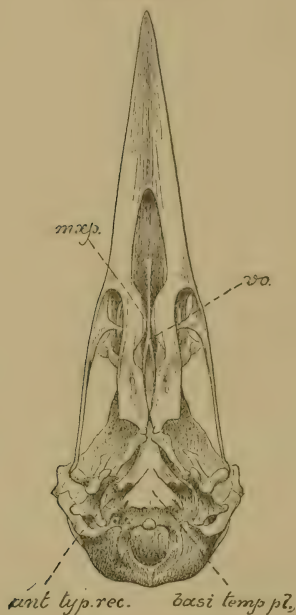
Taking a general view of the premaxillæ of *Dromas* and *Orthorhamphus* the resemblance in morphological details is very striking, but since *Orthorhamphus* is peculiar among the Stone-Plovers in leading a littoral existence, and indeed in making its nest on the actual shore, this resemblance does not warrant any deductions as to a like affinity, and may be ascribed solely to functional stress.

The Base of the Skull.—In *Dromas* there is a somewhat deep and distinctly defined cordiform pre-condylar fossa (text-figure 11). The basi-temporal plate is thin and equilateral, its surface being smooth and grooved in the sagittal axis, while its postero-external angles do not terminate in the downwardly projecting processes so characteristically seen in the Gulls and Terns.

In place of these we observe in *Dromas* a sharp spur-like or pointed process, directed outwards and backwards, a condition which is more perfectly seen in the Skuas and less perfectly in the Golden Plover. Curiously enough, the downwardly projecting processes so characteristic of the *Laridæ* are to be noticed in *Squatarola*, while they are present in some Stone-Plover genera (*Ædicnemus*) and absent in others (*Orthorhamphus*).

The osseous irregularities along the base of the basi-temporal plate are not, in *Dromas*, mammillated or conspicuous as they are in *Hematopus*—the condition noticed approaching that peculiar to the Skuas.

Text-figure 11.

Palatal view of the skull of *Dromas ardeola*.

ant.typ.rec., anterior tympanic recess; *basi temp.pl.*, basi-temporal plate; *mx.p.*, maxillo-palatine processes; *vo.*, vomer.

In *Dromas*, as well as in the Gulls, Terns, Skuas, Stone-Plovers, and Charadriidæ, the planes of the basi-occipital and basi-temporal are almost identical, but in the Oyster-catchers the two planes are inclined at a conspicuous angle.

In respect of the arrangement of the Eustachian tubes and the underlap of the apical portion of the basi-temporal plate, *Dromas* appears to be larine. Shufeldt says ('Emu,' vol. xv. 1915, p. 6) that in this respect *Orthorhamphus* is larine, and with this statement I agree, but other Stone-Plover genera such as *Ædicnemus* seem to present transitions from the pluvialine condition to the larine. Both the Sheath-bills and *Hæmatopus* are in this respect pluvialine, but the condition seen in the former is peculiar.

The pterygoids in *Dromas* are somewhat short and pluvialine. They are compressed from side to side. Viewed from their basal aspect, they appear more ribbon-like than in *Larus*, in which genus (and other true larine genera) we get an impression of long, thin, and rounded rods. Even in the Laridæ, however, the pterygoids are compressed from side to side, and produced dorsally into a thin-edged border. In the Skuas the pterygoids are almost strictly rod-like structures, viewed from every aspect, but they are shorter than in the true Gulls. Although the skulls of *Larus canus* and *Dromas ardeola* are almost exactly the same length, and have the same general proportions, yet the length of the pterygoids in *Larus* are 13·5 mm. as compared to 11 mm. in *Dromas*.

In the adult *Dromas* there is no hint of any articulation between the pterygoid and the basisphenoidal rostrum (no basiptyergoid processes). In *Hæmatopus* the pterygoids are very short, actually nearly as short as in the Golden Plover. Basiptyergoid processes are present, and the whole picture is typically pluvialine. In the Stone-Plovers the pterygoids are neither typically pluvialine, larine, nor stercorarine. They may be said to be ædicnemine. In regard to their length, however, the pterygoids of *Orthorhamphus* approach a larine condition. Shufeldt (*l. c.*) says that "the pterygoids of *Orthorhamphus* and *Ædicnemus* are much more like these bones in Gulls, in *Chionis*, and others, than they are in birds belonging to the typical Charadriinæ."

Palatal Region.—The palatal structures of *Dromas* come closer to those of ædicnemine genera than any other

Charadriiform groups with which we have compared them ; but of these genera they are closest to *Orthorhamphus*. The resemblance to *Orthorhamphus* is remarkable, but is probably an instance of parallelism, or due to similar functional stresses. The resemblance of the interpalatine laminae and the prepalatine processes with their continuation forwards into the palatal processes of the premaxillae is to be specially noted.

In *Dromas* the identity of the palatal surfaces of the maxillo-palatines is almost lost on the prepalatine bars, owing to their narrowness and to their nearly complete fusion with these structures. In *Orthorhamphus* the fusion is not so complete, but, nevertheless, the maxillo-palatines of this genus come very close to those of *Dromas*. In *Hæmatopus* we seem, as regards the morphology of the palatal plates, palatal bars, the complete fusion of the maxillo-palatines, and their diminished size, to have gone a stage further than *Dromas*.

Reverting to the maxillo-palatines, these in *Dromas* present on their external aspect and towards their hinder half a slipper-like sac, with its toe directed proximally. The maxillary sends a triangular process directly inwards to join the maxillo-palatine at the point of entrance to this slipper-like sac. In *Chionarchus* I have noticed exactly the same condition of things. In *Orthorhamphus* the maxillary sends a like process inwards to fuse with the outer edge of the scroll-like palatal surface of the maxillo-palatines. In *Hæmatopus* a modified or very specialised arrangement is seen. In this last genus it is curious to notice that the hinder border of the maxillo-palatines completely fuses with the ethmoidal portion of the palatal plate, so that there is absolutely no break whatever between the two.

In *Larus* and *Rissa* the palatal surfaces of the maxillo-palatines are quite free, except at their distal extremity (cf. 'Ibis,' 1916, p. 146, text-figure 4), and here the maxillary joins them. As a consequence, we get no fenestrum distad of this process in the Laridæ, as we do in the Skuas, Stone-Plovers, Oyster-catchers, Sheath-bills, Crab-Plovers, and pluvialine forms generally. The difference in

this respect between *Larus* and *Stercorarius* is noteworthy, and I have already called attention to it in 'The Ibis' (*l. c.*).

Quadrate.—In all the groups that have been discussed, including *Dromas*, the quadrate has its own peculiar and distinctive characteristics. The orbital process of the quadrate in *Dromas* is very similar to that of *Stercorarius*. The quadrates of *Hæmatopus* and *Chionis* both agree in being relatively and actually longer than in either of these last-mentioned genera. In *Dromas* there is a foramen, leading into a pneumatic chamber, on the inner surface of the body of the quadrate. In *Larus* it is noticed on the posterior surface. In the Skuas there is also a foramen on the inner surface, but it is placed lower down than in *Dromas*, just above the quadrato-ptyergoid articulation. Such precise and apparently meaningless, and probably useless, distinctions in regard to a small point such as this, compels the thought that such differentiations could hardly have been brought about through the process of continuous variations. The constancy of the precise position of these quadratal foramina in a series of skulls of any groups selected, *e. g.* the Gulls or the Skuas, is very remarkable, no matter what genera are taken in either group.

Antorbital Plate.—In *Dromas* this is a strongly ossified, triangular or ear-shaped process. So it is in *Larus*; but in *Dromas* the descending process of the lacrymal approaches this extension of the pre-ethmoid at a different angle (see under "Lacrymal").

Turbinals.—In *Dromas* a prominent bridge of bone proceeds from the superior border of the antorbital plate, to fuse with the outer rim of the external and superior border of the pre-ethmoid. It is continued forwards as a thin turbinal plate, which is ossified. A very similar arrangement is seen in *Larus* and *Stercorarius*. Mesial of the above-mentioned bridge is seen a foramen for the olfactory nerve.

Interorbital Septum.—The fenestra in *Dromas* are somewhat peculiar, but, on the whole, are reminiscent of what obtains in *Squatarola*, except that the lower and largest fenestrum is quadrangular.

Vomer.—This bone sits astride of the parasphenoidal rostrum, as in *Larus* or pluvialine Waders. It is continued forwards well beyond the maxillo-palatine processes as a thin spiculate process, apparently slightly truncated at its extremity.

Other Osteological Characters.

Vertebral Column.—In *Dromas* there are 15 cervical vertebæ, which may be subdivided into—cervicals proper 12, cervico-dorsals 3.

The three cervico-dorsal vertebæ have hypapophyses which are peculiar to them alone. The first two dorsal vertebæ have hypapophyses which are thin, laterally compressed triangular plates, with the apex directed downwards and forwards. The apices are bifid.

The last two cervical vertebæ proper (11th and 12th) have their hypapophyses distinctively shaped. They are thin, laterally compressed, plate-like processes with truncated free ends directed forwards and upwards. The hypapophysis of the 10th cervical vertebra is bifid. The three cervico-dorsals carry floating ribs, the first pair being very short. The last cervical vertebra proper has a costal process, which is fused with the centrum. *Hæmatopus*, it may be noted, also has three cervico-dorsal vertebæ, and, as in *Dromas*, on each of these three vertebæ the articulation for the capitellar head of the free rib is quite obvious and distinct.

In *Hæmatopus* the 2nd and 3rd dorsal vertebæ have hypapophyses which are very similar to those seen in *Dromas*. The hypapophysis of the first dorsal vertebra is like that of the last true cervical in *Dromas*.

In *Charadrius pluvialis* there are three cervico-dorsal vertebæ, as also obtains in *Ægialitis hiaticola*. Curiously enough, *Squatarola* has only two.

I have also noted that there are only two cervico-dorsal vertebæ in the following Charadriiform genera:—*Vanellus*, *Lobivanellus*, *Chionis*, *Chionarchus*, *Ædicnemus* (and perhaps other ædicnemine genera), and *Arenaria*.

In the Sheath-bills the 1st and 2nd dorsals have hypapophyses which are very similar in appearance to those of

Dromas, but that of the first is triradiate instead of bifid at its extremity. The hypapophyses of the cervico-dorsals are also very similar to, if not identical with, those of *Dromas*.

Sternum.—This is long and laterally compressed, and in general features is more pluvialine than larine.

Humerus.—Taking this bone as an index of the whole upper limb, I find that the characters exhibited by it are distinctly pluvialine. It is easily to be distinguished from either a larine, sternine, or stercorarine humerus.

Lower Limb.—There are no points about the bones of the lower limb worthy of special notice here. It seems sufficient to note that they present pluvialine characters.

Skull of a Chick.

The most interesting feature about the skull of the nestling Crab-Plover sent to me by Dr. Brockman was the fact that basiptyergoid processes were present. As might have been expected, these were not so perfect as was the case in the young *embryo* Sheath-bill referred to above (*cf.* text-figure 7), since this young Crab-Plover had evidently been hatched for several days; but, nevertheless, both the facets on the pterygoids and the corresponding processes on the basisphenoidal rostrum are very clearly to be seen in the specimen which I have preserved and which is now in the British Museum collection. Moreover, on the left side a distinct and tough ligamentous band is to be noted joining the basisphenoidal process to the pterygoidal.

As regards the rest of the skull, very little more can be learnt from it than from an adult skull, except that the supraorbital portion of the vault of the cranium has a more generalised and has a more true limicoline facies than is the case in the adult skull. We might, indeed, go further, and state that this anterior frontal, as well as the lacrymo-nasal region, is reminiscent of a tringine (totanine *olim*) Wader, so narrow is the interorbital space and so little specialised and simple are the supraorbital margins and grooves. Supra-occipital fenestra are not present or indicated.

A comparison of the skull of this young Crab-Plover with the skull of a newly-hatched Tern seems to suggest no close affinity, in the sense that the Crab-Plover would be called a Tern. In the quite young nestling Tern examined (two or three days old) the arrangement and development of the maxillo-palatines, maxillaries, and palatines was almost an exact reproduction of what obtains in the adult Tern, the maxillo-palatine processes being especially well developed, conspicuously advanced in ossification, and entirely free from any fusion with the palatal bars. In this Tern chick the relics of basipterygoid articulations were distinctly evident. No supraoccipital fenestra were indicated. The antorbital plates were cartilaginous. The interorbital region (pre-frontal and frontal) had a distinctly more generalised (true limicoline) facies than obtains in the adult Tern, and, indeed, the general configuration and the absence of specialization in regard to the whole of the upper portion of the skull and premaxilla was very reminiscent of the Turnstone.

It seems hardly necessary to add that until a series of actual embryos of the Crab-Plover and Tern are available for the purpose of comparison, we are not likely to get much further towards probing the secrets of their phylogeny; but we have tried to make the best of the material at our disposal

Summary.

The above review of some of the principal features in the osteology of *Dromas* seems to fully justify the opinion that this peculiar type of Wader deserves a special niche of its own in the classification of the Chadriiformes, and that its affinities with the Gulls, Terns, Stone-Plovers, or other aberrant groups are no closer than is implied in the conception that all such groups have a common ordinal or subordinal fellowship. Using the term "Plover" to embrace any Wader comprised in the true Limicolæ (Charadriidæ—Scolopacidæ), *Dromas* is undoubtedly a specialised Plover, just as a Gull is a specialised Plover; but any Gull-like,

Tern-like, or Stone-Plover-like characters which it may possess are superficial characters which appear to have been moulded upon it either through the plastic influences of similar environments and similar functional stresses, or in virtue of descent from a common ancestral type.

From what one has gleaned from an examination of the skull of the nestling Crab-Plover and of the young Tern, we feel drawn to the conclusion that an examination of embryos of these and other allied aberrant forms would point to the fact that all the Laro-Limicolæ (Gulls, Terns, Skuas, Pratincoles, Sheath-bills, Crab-Plovers, and perhaps Oystercatchers) sprang from the main Charadriiform stem prior to the division of that stem into its charadriine and scolopacine branches. Furthermore, that the scolopacine branch represents the more direct continuation of the ancestral Charadriiform stem and that the true Plovers (Charadriidæ) represent a specialised offshoot from this scolopacine continuation or from the true limicoline stem.

We shall hope in a future paper to make our meaning clearer by means of a diagram, representing the phylogenetic relationships of the whole order Charadriiformes.

XVI.—*The Denudation of the Shaft in the Motmot's Tail.*

By HUBERT D. ASTLEY, M.A., F.Z.S., M.B.O.U.

THE keeping of living birds in captivity will in many cases very much assist collectors of bird-skins and investigators in museums to solve certain moot points ; because the moults can be studied, and not infrequently the nestling plumage made known, when successful breeding comes about in an aviary. Hence it is that aviculture of late years has become a hand-maid to what is understood as scientific ornithology—an extra horse to go as a tandem and accelerate the pace.

And aviculture not only helps with regard to the study of the birds, but also in respect to their nidification, habits, and eggs, for the latter may be laid in captivity when they have never been found in the wild state, and, furthermore,

the displays of male birds can be seen and described where they may not be revealed to the collector.

A case in point is the remarkable characteristic of the Motmots, whose two long central tail-feathers grow at each moult without the racquets, which later on become so conspicuous. I have kept a Motmot (*Momotus momota*) since June 1914, and have consequently been able to study the moult through two successive autumns, and have come to the conclusion that the bird does *not* pick off the barbs from the two central shafts of the tail, but that these barbs fall away. When the feathers grow anew, the vane at the point where the barbs afterwards drop off is narrower than in any other part and, furthermore, thinner, so that light can be seen through the barbs, where it cannot pierce in the rest of the two feathers.

I am not sure whether Mr. William C. Beebe has changed his opinion, but in 1905 he remarked in his interesting book 'Two Bird-lovers in Mexico':—"Each Motmot begins to pick and pick at these feathers, tearing off a few barbs at a time with its bill"; but he does not say that he actually witnessed the performance. He also wrote at length upon the subject in 'Zoologica,'* his observations being based principally upon the study of a living bird kept by him through two moults. Mr. Beebe maintained in that article that his bird removed the barbs with its bill, but my contention that this is not the case seems rather borne out by his experiments, for after the captive Motmot had fully grown the two central tail-feathers, they were pulled out in order to study those that would replace them. In the second complete moult through which the bird passed, it was apparently not in robust health, and when Mr. Beebe removed the central tail-feathers, the fresh ones appeared enclosed in sheaths for a length of a few inches, and when these sheaths dropped away, the racquets were revealed, as far as I understand, with bare shafts above them; the barbs, that are naturally weak at these points, having been undeveloped in this case, where the bird itself had

* 'Zoologica,' New York, i. 1910, pp. 141-149.

deteriorated in strength, so that they were not pecked away. It seems therefore that the natural weakness of the vanes had been further increased through that of the bird itself, and also because an extra strain had been put upon feather-production through the plucking of those tail-feathers which had only lately grown, just as one sees feathers in weakly birds become white, owing to a deficiency in the vigour of the blood with a consequent loss of colouring pigments. Therefore, to my mind, it would seem that in the case of Mr. Beebe's Motmot, the deterioration which is perhaps gradually taking place through many ages was, as it were, artificially hastened and brought about.

The Racquet-tailed Parrots, and I presume the Kingfishers also that have these ornamental tail-feathers, grow the racquets with a portion of the shafts already bare of any barbs, and this narrowing and weakening of the barbs in the central tail-feathers of the Motmots may be working towards this in the far future.

I have *never* seen my Motmot, when preening his feathers, touch the extremities of his tail-feathers with his bill—indeed, it would almost seem as if he were unable to do so, for, owing to the feet being very small in proportion to the bird, after the style of a Kingfisher or a Roller, any extra exertion in preening is apt to overbalance the bird; so that, for instance, he only just manages to scratch the sides of his head by a rapid movement of the uplifted foot, and it is evident that his balance would be lost off his perch if he did not immediately return the foot to grasp it, as I have frequently seen happen. Magpies and other birds with long tails, such as the Indian Shâmah, can and do preen the entire length of the feathers, and one has often watched the process; but in the case of my Motmot, I have *never* seen him go beyond the shorter lateral feathers of the tail.

Be this as it may, my idea remains that the bird does not pick off the barbs above the racquets, but that they fall off without any aid on the part of their wearer.

Not until the entire moult is complete does this come

about. In a week or so after the bird is once more in full plumage, I noticed that here and there along the narrow vane, a shaft was absent, but in quite irregular spots, until at last, after perhaps about a month, the shafts are bare, and the racquets which broaden out at the extremities have appeared—or, rather, are emphasized.

My Motmot is in magnificent condition—a condition which no bird in a wild state could excel,—his vigour and tightness of plumage being very fine, so that I have a good subject to study.

As a description of my Motmot, with his interesting habits, will be published in the ‘*Avicultural Magazine*,’ along with a coloured plate of two birds, the one showing the tail as first grown, the other with the bare shafts and racquets, I will not further enlarge upon the subject or trespass upon valuable space.

XVII.—*Obituary.*

HENRY EELES DRESSER.

As was briefly announced in the last number of ‘*The Ibis*,’ Mr. Dresser died at Cannes on November 28 last, at the age of seventy-seven. He was one of the oldest members of the Union, having been elected as long ago as 1865. He held the post of Secretary from 1882 to 1888, and was always active and prominent in the affairs of the Union and in ornithology generally till a year or two ago, when he became an invalid and was no longer able to take part in our discussions.

Dresser was born on May 9, 1838, at Thirsk, in Yorkshire, where his grandfather had founded the Thirsk Bank. His father, being a younger son, migrated to London in 1845 and started as a Baltic timber-merchant. Young Dresser, after being at school at Bromley, in Kent, and at a German school near Hamburg, entered his father’s business and travelled extensively in northern Europe from 1854 to 1862. Early in 1863 he took a cargo out to Texas, then

one of the Confederate States, during the northern blockade. In 1870 he started business in London in the metal trade, but he continued to travel extensively throughout the whole of his life, and from the time when he was at school in Germany he began to collect eggs and bird-skins systematically. His collections, almost entirely of the eggs and skins of Palearctic birds (the latter about 12,000 in number), were deposited in the Manchester Museum at various times from 1899 onwards. Each specimen is fully authenticated and adequately labelled. The care with which he attended to these matters rendered his collection one of the most valuable in the country.

Dresser's first scientific paper was devoted to his "Notes on the Birds of Southern Texas," and was published in 'The Ibis' in 1865. From that date until 1909 he has constantly contributed papers and letters to our journal, but his most important work is undoubtedly the well-known 'History of the Birds of Europe, including all the species inhabiting the Western Palearctic Region.' This work was commenced in 1871 in collaboration with the late Dr. R. Bowdler Sharpe, but after the publication of several parts Dresser continued the work alone. Eight quarto volumes were issued between 1871 and 1881, illustrated with 633 hand-coloured plates, prepared mainly from drawings by Joseph Wolf and J. C. Keulemans. A ninth volume, forming a Supplement, was completed in 1895-6, and the whole forms a monument of the industry and accuracy of the author.

Other works were as follows :—

A Monograph of the Meropidæ, or Family of Bee-eaters. 1 vol. London, 1884-86. Small folio. With 34 plates.

A Monograph of the Coraciidæ, or Family of Rollers. 1 vol. Farnborough, Kent, 1893. Small folio. With 27 plates.

Manual of Palearctic Birds. London, 1902-1903. 8vo.

Eggs of the Birds of Europe. London, 1905-1910. 4to.

Dresser belonged to the old order of systematic ornithologists who did not believe in subspecies or trinomials, and

his views on the limits of specific variation and nomenclature would not perhaps commend themselves to present-day workers. All he wrote, however, was marked by a thorough and a rigid accuracy of description and attention to detail, and he took special pains to get his illustrations executed and reproduced in the most perfect manner possible, so that his monographs and the 'Birds of Europe' were as monuments of ornithological literature. His death is a great loss to us all, and removes one more link in the chain connecting us with the giants of the middle of the nineteenth century.

DANIEL GIRAUD ELLIOT.

From 'Science' we learn with great regret of the death of Dr. Elliot, which took place on the 22nd of December last, from pneumonia, in his home in New York. He had reached the advanced age of 80 years and had become the "doyen" of American naturalists.

Born in New York City, March 7, 1835, Dr. Elliot was the fourth son of George T. and Rebecca Giraud Elliot. His father was of old Connecticut stock, which had settled in America in the sixteenth century, and was of Scottish origin, while on his mother's side he was descended from French ancestors.

Delicate in his early years, he was unable to take a college course and spent much time in travelling. He came to London in 1859, and as he relates in a eulogy of our late editor, Dr. P. L. Selater, there met him and many of the other mid-Victorians and the early M. B. O. U.'s. During the sixties he was busily engaged in forming a collection of birds and preparing his monographs of the Tetraonidæ and the Pittidæ. His collections passed into the possession of the American Museum of Natural History in New York in 1868, and form the foundation of the vast stores which have since been accumulated there. During these years, as he tells us in an address before the Linnean Society of New York in 1914, there were only three working ornithologists in America besides himself—George Lawrence

in New York, John Cassin in Philadelphia, and S. F. Baird at Washington.

In 1869 Dr. Elliot left America primarily for study, but also with a commission from the Trustees of the American Museum to purchase any collections which he thought advisable. He secured for the Museum those of Prince Maximilian of Neuwied, who had lately died, and had travelled extensively in South America and the western part of the United States, making large collections. He also selected many rare birds from the Verreaux collection in Paris, and from those of other dealers in Amsterdam and London. At this time he purchased a specimen of the Great Auk in winter plumage for £105; this is now one of the most cherished possessions of the American Museum. During this period Elliot lived principally in London, and was very well known to all the English ornithologists of those days.

Returning to America in 1883, he brought with him a wonderful collection of Humming-birds, which he presented in 1887 to the American Museum, while his extensive ornithological library also passed to the same institution by purchase.

In 1894 Elliot became Curator of Zoology of the newly-founded Field Columbian Museum at Chicago. This post he held until 1906, when he resigned and returned to New York. During this period he made an expedition to Africa in the interests of the Museum, selecting, on the advice of the late Dr. Scater, the Somaliland country for this purpose. Though even then over sixty years of age, he was wonderfully successful and succeeded in bringing back a large collection of birds and mammals, which not only became the basis of important exhibits in the museum, but of several valuable papers giving the results of his explorations.

After settling down in New York in 1906, Elliot gave up birds and occupied himself with 'A Review of the Primates,' begun in 1906 and completed in 1912, and published in three volumes by the American Museum. In order to examine all the types of this group, Elliot travelled round

the world, through all the European capitals, and through India and China, back to America.

Last year, on the occasion of his eightieth birthday, the American Museum made public recognition of his services by the publication of a brief biographical sketch with several portraits, and at the same time presenting to him an address signed by the whole of the Museum staff, and recording their "grateful appreciation of his services as an expert adviser of the Museum in its early days" (*Amer. Mus. Journ.* xv. 1915, pp. 133-141), while the Linnean Society of New York in the previous year held a dinner in his honour and presented him with their medal.

Elliot will be chiefly remembered for his series of magnificent illustrated monographs on various groups of birds, rivalling those of Gould in their fine plates, chiefly from the brush of Wolf and Keulemans, though his earlier works were mainly illustrated from his own drawings. The following is a list of some of his most important ornithological publications:—

- A Monograph of the Pittidæ or Family of the Ant-Thrushes. 31 pls. col. with descriptive letterpress. New York, 1863. Folio: 2nd ed. 51 pls. col. London, 1893-5. Folio.
- A Monograph of the Tetraoninæ, or Family of the Grouse. 27 pls. col. with descriptive letterpress. New York, 1865. Folio.
- The New and Heretofore Unfigured Species of the Birds of North America. 2 vols. 72 pls. col. New York, 1869. Folio.
- A Monograph of the Phasianidæ, or Family of Pheasants. 2 vols. 48 pls. col. New York, 1872. Folio.
- A Monograph of the Paradiseidæ, or Birds of Paradise. 37 pls. col. with descriptive letterpress. London, 1873. Folio.
- A Monograph of the Bucerotidæ, or Family of the Hornbills. 59 pls. col. with descriptive letterpress. London, 1876-1882. Imp. 4to.
- A Classification and Synopsis of the Trochilidæ. Pp. xii+277. Washington (Smithsonian Contributions to Knowledge), 1879. 4to.
- North American Shore-Birds. Pp. xvi+268. New York and London, 1895. 8vo.
- The Gallinaceous Game-Birds of North America. Pp. 220, 46 pls. London, 1897. 8vo.
- The Wild Fowl of the United States and British Possessions. Pp. xxii+316. New York, 1898. 4to.

Dr. Elliot was elected a Member of our Union in 1870, and only resigned in 1906 when he had turned his whole attention to Mammals. He wrote a paper for the first volume of 'The Ibis,' and is certainly the last survivor of those who did so; he also contributed many other papers to the pages of 'The Ibis' and the 'Proceedings of the Zoological Society' while settled in England. He was a Fellow of the Zoological Society of London and of the Royal Society of Edinburgh. He was one of the founders of the American Ornithologists' Union in 1883 and its President for two years (1890-91), and an active member of its Council for twenty-eight years.

Dr. Elliot was a man of striking personality as can be seen by his portrait, reproduced in the American Museum Journal. Many of our older members will remember his snow-white hair and beard set off by his flashing black eyes. Somewhat dignified and reserved in manner, conservative though broad-minded, he was most constant and sympathetic in his personal friendships, and his many writings, dating from almost boyhood to the present day, will keep him always in memory.

ERIC FRANK PENN.

We regret that we have not previously noticed the death of Capt. E. F. Penn, 4th Battalion Grenadier Guards, who fell in action near Vermelles, in northern France, on October 18 last year.

Born in London, April 17, 1878, the son of William and Constance Penn, of St. Albans Court, Dover, he was educated at Eton and Trinity College, Cambridge; he subsequently became a partner in Messrs. Carden & Co., of Threadneedle St. During the South African war he served with the 3rd Batt. Royal Scots and attained the rank of Captain. He again joined the army at the commencement of the present war, obtaining a commission in the Grenadier Guards.

Capt. Penn was a keen sportsman and a fine shot, and

was thus interested in birds. He joined the Union in 1898. He was also a good cricketer, playing at Lords for the Eton XI. in 1896 and 1897, and for the Cambridge XI. in 1899 and 1902.

CHARLES STONHAM.

We regret to hear that Col. Charles Stonham, C.M.G., died on January 31 last, at his residence 4 Harley St., from the effects of a severe illness contracted while on service with the forces in Egypt.

Born in March 1858, he was the son of Mr. T. G. Stonham, of Maidstone, and was educated at King's School, Canterbury, and at University College, London, where he was Aitchison Scholar and Gold Medallist in medicine, obstetric medicine, and surgery. He was for many years connected with the Westminster Hospital, where he became Senior Surgeon in 1897. He was also at one time a member of the Board of Examiners in Anatomy for the Royal College of Physicians and the Royal College of Surgeons.

During the South African war he was Chief Surgeon and the Officer Commanding the Imperial Yeomanry Field Hospital, and for his services he was mentioned in dispatches, received a medal and four clasps, and was appointed C.M.G. During the present war he went to Egypt as Lt.-Col. in command of the London Mounted Brigade Field Ambulance; he became Inspector of Hospitals there, but his health failed and he had to return to Europe at the end of last year.

Stonham was much interested in Natural History and especially in British Birds, of which he had a considerable collection. He was the author of 'The Birds of the British Islands,' published by Grant Richards in twenty parts between 1906 and 1911. This work is illustrated by 318 uncoloured plates by Miss Lilian M. Medland and contains much useful and valuable information, including an interesting bibliography of British Birds by Major Mullens. Stonham was elected a Member of the Union in 1893, and contributed a short paper to 'The Ibis' (1909, p. 619) on the curious

heel-pads found in the nestling Green Woodpecker; these are also known to be present in the Wryneck and the Barbet (*Cyanops*).

By a printer's error Col. Stonham's name was accidentally omitted from the last printed list of our Members, but he was a M.B.O.U. till his death, which deprives us not only of an enthusiastic fellow-ornithologist, but also of a brilliant surgeon.

XVIII.—*Notices of recent Ornithological Publications.*

Bonhote on Vigour.

[Vigour and Heredity. By J. Lewis Bonhote, M.A., F.L.S., F.Z.S. Pp. 1-276, with coloured and uncoloured plates and diagrams in text. London (West, Newman & Co.), 1915. 8vo.]

The study of the principles which underlie the inheritance of characters is the only road along which we are likely to make much headway in the elucidation of the many outstanding problems which are for ever confronting the zoologist of today. The laws, for instance, which govern the evolution of geographic species or subspecies; the problem of many very closely allied species inhabiting the same localities, living under the same conditions, and yet differing slightly and constantly without the intermingling of characters; the ready adaptability of some species, the immutability of others; the fertility of some hybrids, the infertility of others. These and a host of other kindred problems which will readily suggest themselves are, as Mr. Bonhote implies in his recent book on "Vigour and Heredity," not likely to be solved except as the result of much patient investigation, in the experimental breeder's pen, in the gardens of the horticultural scientist, or in the laboratory of the physiologist. If the assiduous collection and description of daily increasing hosts of specific or subspecific entities, necessary as that colossal task has been, has not advanced us very far towards the solution

of problems which lie at the very root of the secrets of evolution, we are not likely to get much further by still more assiduous collecting. The time has therefore arrived when it behoves us to make use of the vast mass of data collected; the time has come when the more comprehensive student of zoology must take thought and marshal the facts gleaned by himself and others in the hope of probing the grand secrets of nature.

As one more effort in this laudable direction we welcome Mr. Bonhote's volume, the object of which is to expound a theory which, while recognising the partial truths of Mendel's and Galton's theories of inheritance and the part, within its limits, played by Natural Selection, seeks to reinforce such theories and to clear them up where they fail.

Mr. Bonhote's medicine is a theory of Vigour, and by vigour he means "activity of nutrition and function" or "rate of metabolism."

The first five chapters of the book are taken up in the enunciation of the author's ideas on vigour and its effect on the coloration and sex of mammals and birds. Then come five chapters devoted to experimental results, while finally we have six chapters dealing with the evolution of sex, the psychology of reproduction, and the consideration of various hypotheses concerned in the inheritance of characters. Whether Mr. Bonhote attains the object which he had in view in setting forth his theory we prefer to leave to the judgment of those who read his book, which we confidently recommend as affording much food for thought in many interesting directions, whether we altogether agree with his theory or not.

The dominant idea which Mr. Bonhote puts forward is somewhat heterodox and is comprised in the thesis that environment, using the term in its wider sense, affects the physiological status of the parent and may have some influence on the characters of the offspring, the vigour of the parent being reflected in the vigour of the germinal cells and hence in the vigour and character of the inherited determinants. Mr. Bonhote, in fact, seems to partially, if not actually, accept the fact of the inheritance of acquired

characters, as may be gathered from his arguments (on page 7) that "fluctuating variations" brought about by environment are due to differences of vigour. Vigour, he says, affects the offspring and we thus get superimposed on the mendelian characters an *heredity brought about by environment* (italics ours).

Ornithologists can hardly fail to be interested in the many illustrations given by Mr. Bonhote in which he strives to show that temperature, humidity and food-supply influence vigour and through vigour coloration. In his discussions on the subject of coloration, however, Mr. Bonhote appears to us to hardly do more than touch on the fringe of the subject, for he draws no distinction between coloration or mere depth of tones or shades and colour-pattern. Differences in colour-pattern cannot, we conceive, be caused by either temperature, humidity, food-supply, or any amount of vigour.

In our belief there are "environmental or physiological species" and "germinal species"—the last perhaps the only true species. Mr. Bonhote does not appear in his book to distinguish sufficiently between the two. All his arguments seem to us to apply to the former category. To our mind the most interesting chapter in the book is that on "The Evolution of Sex."

Chapman on new Colombian Birds.

[Diagnoses of apparently new Colombian Birds.—IV. By Frank M. Chapman. Bull. Amer. Mus. Nat. Hist. New York, xxxiv. 1915, pp. 635-662.]

The already large collections of birds from the northern parts of South America in the American Museum have recently been further enriched by a visit of the collectors, Messrs. Miller and Boyle, to the parts of the province of Antioquia hitherto not explored by naturalists. In the present paper a number of new forms collected by them as well as by others are diagnosed.

Only one new species is described—*Crypturus kerriæ*. Twenty-four new subspecies (belonging to the genera *Crypturus*, *Tachytiorchis*, *Herpetotheres*, *Aulocorhynchus*,

Picumnus, *Conopophaga*, *Microbates*, *Xiphorhynchus*, *Siptornis*, *Automolus*, *Manacus*, *Phyllomyias*, *Habrura*, *Microcerculus*, *Polioptila*, *Sporophila*, *Catamenia*, *Phrygilus*, *Cyanerpes*, *Iridosornis*, *Cacicus*, *Amblycercus*, *Molothrus*) are characterised.

Dewar on Indian Birds.

[A Bird Calendar for northern India. By Douglas Dewar. Pp. viii + 211. London (Thacker), 1916. 8vo., 6s.]

In "A Bird Calendar for northern India" Mr. Dewar attempts to epitomize for the general reader the interesting notes recorded by Hume, Blanford and others on the nidification and migration of Indian birds. He has succeeded in giving a very fair idea of the movements of the more common birds in the extreme north and north-west of India, and the book may also be of some use to beginners in the art of egg-collecting.

It is perhaps unfair to expect ornithological accuracy in a little work of this scope, but the inaccuracies are so numerous and some so glaring that they cannot be passed over in silence. Thus Mr. Dewar writes of the Sarus Crane building a *floating* nest, and adds: "a favourite place is some low-lying field where the water is too deep to admit of the growing of rice." Again, he speaks of Iora's eggs as being of a "salmon hue" (p. 72), whereas the normal tint is grey and the exception salmon, and on the very next page he describes the Tailor-birds' eggs as "white spotted with red," quite ignoring the well-known fact that the eggs may be white, pink or blue in ground-colour and either speckled, spotted or dotted with any shade of red or brown. Where, too, shall we find the "yellow and sable" female Minivets to which the author refers (p. 51); we were under the impression that the females, unlike the males, had no black on their plumage beyond a little on their tails. Again, we should hardly have expected the author of "The making of Species" to fall into the primitive error of writing about subspecies interbreeding (p. 47). Surely the castigator of Darwin and Huxley himself knows that geographical races

or subspecies are themselves always more or less intermediate in form in the areas which are intermediate to the central habitats of the individual races.

On the whole this little work will not add to the author's reputation either as an observer in the field or as a recorder of his own and other peoples' observations.

Grinnell on Californian Birds.

[A Distributional List of the Birds of California. By Joseph Grinnell. Cooper Ornithological Club, Pacific Coast Avifauna, no. 11, pp. 1-217. Hollywood, Cal., 1915. 8vo.]

The State of California, on the Pacific Coast of North America, is, after Texas, the largest in the Union, and occupies an area one and three-quarters that of Great Britain. The first list of the birds of the State was drawn up by Dr. James G. Cooper, and published as a contribution to Cronise's 'Natural Wealth of California' in 1868. Dr. Cooper's name is preserved in that of the Club, by which the present list is published; moreover, this is the third list prepared by the present author and published by the Club. The first, published in 1902, contained the names of 491 species; the second, in 1912, 530; the present one 541. The nomenclature and classification of the A. O. U. Check-list is, with some unimportant exceptions, adhered to throughout, and to each species listed is given an account of its status, so far as it is known, within the State, with some bibliographical indications. A carefully prepared coloured map of the Life-zones, and a smaller one of the faunal districts, completes this carefully-prepared volume, which will doubtless prove invaluable to our ornithological brethren of the Cooper Club.

Mottram on Sexual Dimorphism among Birds.

[The Distribution of Secondary Sexual Characters amongst Birds, with relation to their Liability to the Attack of Enemies. By J. C. Mottram, M.B. (Lond.). Proc. Zool. Soc. London, 1915, pp. 666-678.]

Mr. Mottram finds that marked sexual dimorphism among birds is met with chiefly in those groups which are most liable

to the attack of enemies, and that among birds which do not appear to be specially so liable, sexual dimorphism is rarely, if ever, present. He divides the bird-families of the world into five groups, according to what he believes to be their relative vulnerability to enemies, as follows:—terrestrial, arboreal, aerial, aquatic, and oceanic. The first of these groups is the most vulnerable, the oceanic the least, and Mr. Mottram finds that the proportion of birds exhibiting sexual dimorphism is far the greatest in the first group, where at least 38 per cent. of the families show this trait more or less, while among the oceanic group there is practically no sexual dimorphism.

There are a number of other tables given with a view to prove this thesis, but the author does not attempt to give any reason for this correlation between sexual dimorphism and vulnerability, nor are we satisfied that it is possible to divide birds into classes according to this last characteristic. We hardly know sufficiently well the habits of birds to estimate the amount of their vulnerability, and, unless we can make sure of this foundation, it appears to us that the whole of the argument fails.

Van Oort's recent papers.

[Resultaten van het ringonderzoek van het Rijks Museum te Leiden. Door Dr. E. D. van Oort. *Ardea*, Leiden, 1915, pp. 119–126.

Een voor Nederlandsche fauna nieuwe stormvogelsoort, *Puffinus gravis* (O'Reilly). Door Dr. E. D. van Oort. *Ardea*, Leiden, 1915, pp. 130–1.

On a new Bird-of-Paradise from Central New Guinea, *Falcinellus meyeri albicans*. By Dr. E. D. van Oort. *Zoologische Mededeelingen*, i. 1915, p. 223.]

In the first of these papers Dr. van Oort gives a list of birds which had been ringed in Holland and were recovered during the year 1915. The list is not a long one, and there are no very remarkable recoveries. Of three Lapwings, one was reported from Fez, another from southern Spain, and two Black-headed Gulls, ringed respectively in June 1911 and 1913 in Holland, were killed in February 1915 in Portugal.

The second paper adds a new bird to the avifauna of the Netherlands. An example of the Greater Shearwater was found dead on the beach at Noordwijk in November last and sent to the Leyden Museum. This species, though not infrequently occurring on our coasts, has never before been obtained on Dutch shores.

In the third paper a new subspecies (*Falcinellus meyeri albicans*) is described. It was obtained by the third expedition to Mt. Wilhelmina in the Snow Mountains of New Guinea, in 1913, and differs slightly (in having white flanks) from the typical form described by Finsch from south-east New Guinea.

Richmond on Generic Names.

[Notes on several preoccupied Generic Names—Aves. By Chas. W. Richmond. Proc. Biol. Soc. Washington, xxviii. 1915, p. 180. Notes on the Generic Name *Bolborhynchus* Bonaparte. Id. *ibid.* p. 183.]

Stenopsis Cassin 1851 (Caprimulgidae) is preoccupied by *Stenopsis* Rafinesque 1815 (Coleoptera), and is renamed *Thermochalcis*. *Oreomyias* Berlepsch 1907 (Tyrannidae) is preoccupied by *Oreomyias* Reichenow 1902 (Muscicapidae), and is renamed *Oreotriccus*. *Oreospiza* Ridgway 1896 (Fringillidae) is preoccupied by *Oreospiza* Keitel 1857 (Fringillidae), and is renamed *Oberholseria*. *Lamprotes* Swainson 1837 (Tangaridae) is preoccupied by *Lamprotes* "R. L." 1817 (Lepidoptera), and is renamed *Compsothraupis*. *Odontorhynchus* Pelzeln 1868 (Troglodytidae) is preoccupied by *Odontorynchus* Leach 1830 (Crustacea), and is renamed *Odontochilus*.

In the second paper it is pointed out that the genus *Bolborhynchus* Bonaparte, generally considered a *nomen nudum*, is not so, as it was further characterized in a reprint of the original paper published in 'Comptes Rendus,' xlv. 1857, as was often the habit of Bonaparte. Several changes are consequently necessary, and a new genus, *Amoropsittaca*, is proposed for the Parrot, *Arara aymara*, of d'Orbigny.

Roberts on a new South African Bird.

[A new Siskin from South Africa. By Austin Roberts. Ann. Transvaal Mus., Suppl. to vol. v. no. 3, ? January 1916.]

Mr. Roberts describes as new *Spinus symonsi*, allied to *S. tottus* of the Cape Provinces. The type and other examples were obtained in the Sanqabetu valley of Basutoland.

We must protest against the issue of fly-leaves containing descriptions of new species and labelled as supplements to the regularly issued numbers of journals, without pagination and with a date by no means clearly indicated. Such fly-leaves are very apt to get lost and to be forgotten when the volumes of such journals are bound up.

Shufeldt on a Fossil Bird.

[A Critical Study of the Fossil Bird *Gallinuloides wyomingensis* Eastman. By R. W. Shufeldt. Journ. of Geology, Chicago, xxiii. 1915, pp. 619-634.]

The fossil, of which Dr. Shufeldt here gives a critical study, was obtained in the Green River Shales of Middle Eocene age, near the town of Fossil in Wyoming, and was described by Mr. Charles B. Eastman in 1900. It is now preserved in the Museum of Comparative Zoology at Cambridge, Mass.

Dr. Shufeldt has recently had an opportunity of studying this interesting specimen, and has come to the conclusion that it has no Ralline affinities, as was suggested by Dr. Eastman, but is a true Gallinaceous bird, probably closely allied to *Bonasa*, *Canachites*, and *Lagopus*. As the name given to this fossil by Eastman is very misleading, Shufeldt proposes, "should the Canons of Zoological Nomenclature admit of it," to change the name to *Paleobonasa*. This proceeding is, however, undoubtedly in direct opposition to the "Canons of Zoological Nomenclature," and cannot be permitted. A photograph of the original slab and a drawing of a careful restoration add much to the value of this paper.

Shufeldt on the Cranes and Rails.

[Comparative Osteology of certain Rails and Cranes, and the Systematic Positions of the Super-suborders Gruiformes and Ralliformes. By R. W. Shufeldt. Anat. Record, Philadelphia, ix. 1915, pp. 731-750.]

After a short review of the classificatory arrangements proposed by various authors, from Merrem in 1813 to Gadow at the present time, in regard to the Cranes and Rails, Dr. Shufeldt proceeds to examine some of the various forms, such as *Crex*, *Rallus*, *Fulica*, and *Grus*; but on turning to read his conclusions, we find from a correction-slip inserted at the beginning of the paper, that, through some mistake by an accidental exchange of MSS. pages, those given here do not represent his present views, which are to be found in a previous paper on the relationship of *Aramus*, published in the August number of the same journal. As we have not seen this earlier paper, we are unable to give Dr. Shufeldt's final ideas on this point.

Bird Notes.

[Bird Notes, the Journal of the Foreign Bird Club. Edited by Wesley T. Page. Vol. vi. 12 nos., Jan.-Dec., 1915.]

It is certainly a remarkable fact that the enthusiasm of the votaries of aviculture in this country is able to support in a flourishing condition two monthly journals; nor do the number of the articles or the size of the numbers appear to have suffered any diminution through the war. In the matter of coloured plates, however, there seems to be some economy. The present volume contains two only, one by Goodchild of *Munia igneotincta*, and another of the Brown-backed Indian Robin *Thamnobia cambaiensis*.

There are a number of articles on methods of aviculture, plans of aviaries, and other practical matters, especially in a series by the editor, "Visits to Members' Aviaries and Bird-rooms," and also a good many notices of the breeding of rare species in captivity, in several cases for the first time. Mr. R. Suggit writes on *Ortalis vetula* and *Spermophila*

grisea, Mr. W. Shore Baily on *Pyromelana taha* and *Penthetria ardens*, and Dr. L. Lovell-Keays on *Zosterops virens* and *Panurus biarmicus*. The last-named also continues his story of his journey through California, which seems to have been somewhat severely commented on by a critic in the 'Condor.'

Other articles of interest are by the Marquis of Tavistock on his attempts at aviculture without the restraints of caging or the cutting of wings; while among Indian correspondents Major Perreau continues his Bird-notes from Baklot in the Punjab, and Mr. Whistler on the Birds of the Jhelum District in India.

The Condor.

[The Condor. A Magazine of Western Ornithology. Vol. xvii. for 1915, 6 nos.]

'The Condor' is the organ of the Cooper Ornithological Club which, divided into two sections, meets monthly at Berkeley near San Francisco in the north of the State of California and at Los Angeles in the south, and the papers in the magazine have in most cases been read at the Club meetings. As would naturally be the case the greater number of the articles are of local interest, but their value is nearly always enhanced by the numerous photographs with which they are embellished.

Of the faunal articles we have Mr. Harold Heath on the Birds of the Forrester Islands on the south-eastern boundary line of Alaska; though so far north, these islands are well clothed with forest and have an abundant population of land-birds, as they are on the line of the north and south migration. They have recently been proclaimed a reservation, and the exploration was carried out under the joint auspices of the U.S. Fish Commission and the National Association of the Audubon Societies. Other faunal articles are by Mr. A. P. Smith on the Birds of the Boston Mountains of Arkansas; Mr. M. F. French on the Birds of Sacaton, Arizona; Mr. A. A. Saunders on those of Flathead Lake,

Montana; and Mr. E. R. Warren on his observations in South Park, Colorado.

The nests and eggs of *Cypseloides niger borealis* are described by Mr. W. L. Dawson. Although far from being an uncommon species in western America, there has always been a great amount of mystery about the nesting habits of the Black Swift, and very few authentic eggs are known in collections. A Mr. A. G. Vrooman of Santa Cruz in southern California announced some years ago (*Auk*, 1901, p. 394) that he had taken a single egg of this species on the damp bare earth of a sea-cliff. This seemed so improbable a place for a swift to nest in, that little credit was given to the story. Recently Mr. Dawson accompanied Mr. Vrooman on an expedition along the sea-cliffs near Santa Cruz, and was rewarded by finding the nest and eggs and photographing them *in situ*. Another interesting nest, the finding of which is described, is that of the White-tailed Ptarmigan (*Lagopus leucurus*), which breeds at an elevation of 11,500 feet in Colorado. Mr. Bradbury found the nest in a swampy place and the eggs lying in two inches of snow water!

Of new forms, Mr. J. Mailliard describes a new subspecies of Redwinged Blackbird (*Agelaius phoeniceus aciculatus*) from Kern County, California; it appears to have a very restricted distribution, but Mr. Mailliard is convinced of its distinctness.

Mr. L. B. Bishop proposes to distinguish a new race of the Savannah Sparrow, *Passerculus sandwichensis brooksi*; it is resident in south-west British Columbia, near the coast, and sometimes migrates south to California. It was first obtained by Capt. Allan Brooks, who is now with the Canadians fighting in France; and was named after him.

In the asphalte beds at Rancho La Brea there have been found over a hundred thousand bird-bones, now in the collection of the Los Angeles Museum, and Mr. L. H. Miller has discovered among them a curious tarso-metatarsus which he states must have belonged to a "walking eagle." He names the bird *Morphnus daggetti* sp. nov., and believes that it may have been related to the South African Secretary-bird.

Among articles dealing with migration problems is an interesting one by Mr. W. W. Cooke on the migration of the Yellow-billed Loon (*Gavia adamsi*). This species breeds along the northern Arctic coast of North America and south to Great Slave Lake. In winter it is unknown anywhere in the Western Hemisphere, but has been reported from the China and Japanese seas as well as along the coasts of Norway. On migration the species is unknown in the interior of Alaska, so that birds in spring must first go north to Bering Straits, then north-east to Point Barrow where it has not been seen earlier than May 15, then east and then south to Great Slave Lake, a most roundabout route. This seems impossible, and Mr. Wells believes that the problem of how the Yellow-billed Loon reaches Great Slave Lake is the most incomprehensible problem of migration on the North American Continent.

There are many other articles in this magazine we should like to allude to, but we must forbear and can only recommend our readers to subscribe for themselves.

Irish Naturalist.

[The Irish Naturalist. Vol. xxiv. 12 nos., Jan.-Dec., 1915.]

Whether it is owing to the war or to the sad loss Irish ornithology has recently suffered in the deaths of Messrs. Ussher and Barrington, the number of papers of interest to bird-lovers in the 'Irish Naturalist' seems to have fallen off a good deal of late years. In the present volume there is one paper of importance—that by Mr. R. F. Scharff on the Irish names of birds. The list is arranged in dictionary order and the names are printed in Irish characters with an approximate English form for the benefit of those unlearned in the Celtic. The November number is devoted to a long and appreciative obituary notice of Mr. Barrington, prefaced by a good portrait. His loss is assuredly a heavy blow to Irish zoology.

Prof. C. J. Patten contributes a short article on the Eider Ducks recently observed at Inishtrahull off the north coast

of Donegal, and also some notes on other rare birds taken or seen at various Irish lights, including the Icterine Warbler at Tuskar, only once before recorded from Ireland.

Scottish Naturalist.

[The Scottish Naturalist. Nos. 37-48, Jan.-Dec., 1915. Edinburgh.]

Most of the ornithological articles in the 'Scottish Naturalist' for the past year are, as usual, from the pen of the indefatigable editor, Mr. Eagle Clarke. A short note in the January number records the capture of the Aquatic Warbler (*Acrocephalus aquaticus*) in Fair Isle on the previous October 23. It has never before been obtained in Scotland and only twice in Ireland, and is of course a rare straggler in England. Another note introduces a new "British Bird," *Calandrella brachydactyla longipennis*, the Eastern Short-toed Lark. This form was also taken on Fair Isle in November 1907, but remained unidentified until recently. It does not seem to have been hitherto noticed in Europe and is a native of Central Asia from Transcaspia to Tibet. A review of the migratory birds observed at Fair Isle, from the notes of Mr. Jerome Wilson the "observer" and of the Duchess of Bedford, shows that 126 species visited the Isle on migration during the year, and that 225 species had been altogether recorded from this tiny spot. In addition to the two birds already mentioned, *Serinus serinus* and *Syrrhaptes paradoxus* were added to the list in 1914.

Mr. Clarke's other contribution deals with the St. Kilda Wren (*Troglodytes t. hirtensis*), which he has ample opportunity of observing in its native island. He completes the description of some of the plumages and gives us an account of its haunts, song, and food.

The "Report on Scottish Ornithology for 1914" by the Misses Baxter and Rentoul, usually separately published, is printed in the July number of the 'Scottish Naturalist.' It is as usual a most careful piece of work and summarizes all the additions made to our knowledge of the Scottish

Avifauna during the year, under the headings of new occurrences, extensions of breeding range, ringing results, food and other habits, and more particularly migrational movements, which occupies more than half the report.

From Mr. R. Clyne, the lighthouse-keeper at the Butt of Lewis at the northern end of the Outer Hebrides, we have a report of birds observed. The spot is obviously an important one for witnessing the coming and going of birds which traverse the Outer Hebrides in spring and autumn. Unfortunately the ground is very barren and quite destitute of cover, so that few birds rest there.

It is interesting to hear of a new breeding place of the Gannet. A few are reported by Mr. J. S. Tulloch to have settled on the Noup of Noss, Bressay. This is a small island lying to the east of Lerwick in the Shetland Islands. Except for the well-known Bass Rock, all the British nesting places of the Gannet are in western waters. This is therefore a second site on the North Sea.

Reports from several observers of the deaths of numbers of sea-birds from oil floating on the seas appear in the September number. The birds become coated with oil and are unable to swim or fly and so perish miserably. This has been noticed on the coast of Fife, and is doubtless due to the activities of torpedo destroyers and submarines in those waters.

The South Australian Ornithologist.

[The South Australian Ornithologist. Vol. i. 1914 & vol. ii. 1915.]

The first number of this new journal was noticed in 'The Ibis,' 1914, p. 526, and since then we have received seven more numbers, completing two volumes, and we may here briefly summarize their contents. One of the features is a general article in each number on some particular South Australian bird, giving a description and a full account of the distribution and habits. This is done for such birds as *Dacelo gigas whitei* and for *Gymnorhina hypoleuca leuconota*.

There are scattered through the numbers several local bird-lists with field-notes, such as those of Kallioota by Mr. A. M. Morgan, of Rosworthy College by Mr. H. E. Lapper, and of Stoneyfell by Mr. R. Crompton, all places in South Australia; while Mr. E. Asby writes on the birds of Mount Dandenong in Victoria, where the Lyre-bird can still be seen, and Mr. G. M. Mathews contributes a series of notes made by the late Capt. Bowyer-Bower in the Cairns district of Queensland in 1884-5. Capt. Bowyer-Bower's collections are now partly in the British Museum and partly in the possession of Mr. Mathews.

Mr. Mathews also sends some descriptions of new forms (vol. i. no. 2, p. 12). We must protest against his description of a new genus, *Macgillivrayornis*, for a new species, *M. claudi*. There is absolutely no clue to enable the reader to find out what family this new genus should be referred to; from the description it might be anything. The other forms described by him, all from northern Queensland, are *Tyto galei*, *Ægithina temporalis macgillivrayi*, and *Neochmia phaëton albiventer*.

Mr. S. A. White has some interesting reminiscences of his father, Mr. Samuel White—a pioneer, explorer, and early collector—who came to South Australia in 1842. He was a friend and correspondent of Gould's and sent him many new and rare birds for which Gould perhaps hardly gave him sufficient credit. Mr. White also sends a description of a new species, *Acanthiza marianæ*, from the dry north-western part of South Australia, and an account of his examination of the pellets of an Australian Barn-Owl (*Flammea flammea delicatula*), from the examination of which it appears that this Owl lives largely on the Sparrow *Passer domesticus*.

Yearbook of the Dutch Bird Club.

[Club van Nederlandsche Vogelkundigen. Jaarbericht, no. 5. Deventer (Kluwer), 1915.]

In addition to the reports of the meetings, which apparently take place five or six times a year, this Yearbook

contains a report by the President, Baron Snouckaert van Schauburg, on the ornithological occurrences in Holland from October 1914 to September 1915. Perhaps the most interesting of these is the taking of a British Robin ringed in Berkshire on May 13, 1912, in South Holland in November 1914; this subspecies does not appear to have been previously recorded outside the British Isles. In another article Baron Snouckaert gives us some additions and corrections to his 'Avifauna Neerlandica,' published in 1908.

The nesting habits and eggs of the forms of Marsh- and Willow-Tits occurring in Holland and north-west Germany are discussed by Mr. H. C. Siebers. He terms *Parus palustris longirostris* the Matkop, and *Parus atricapillus rhenanus* the Glasskop. His remarks are illustrated with two photographs and a plan of the nest of the Willow-Tit bored in the trunk of a tree.

Other papers in the Yearbook are by Mr. G. J. van Oordt containing field-notes on birds observed in the higher mountain ranges of Switzerland, and by Mr. P. A. Hens on the birds of Valkenburg in the Dutch Province of South Limburg.

Zoological Record.

[Aves in Zoological Record, vol. li. for 1914, pp. 1-77. Printed for the Zoological Society of London and sold at their house in Regent's Park, London, N.W., January 1916. Price 6s.]

The Zoological Record has hitherto formed part of the International Catalogue of Scientific Literature issued each year by the Royal Society jointly with the Zoological Society. Early in 1915 the Royal Society decided to suspend for the present the issue of any further volumes of the International Catalogue. The Zoological Society, however, realizing what difficulties would beset the worker in zoology if the Record were suspended or delayed, determined to continue this invaluable publication on their own responsibility, and the volume for the year 1914 is now complete.

The portion dealing with Ornithology has been compiled by Mr. W. L. Slater and contains the titles of 1088 publications against 1576 in that of the previous year. Of these 284 are from the British Islands as compared with 370 of the previous year, 227 from the United States against 368, 197 from Germany against 309, and 57 from France against 130, showing how the war has interfered with scientific work. There have been also many other difficulties to contend with owing to the interrupted communications with neutral as well as enemy countries, and it has been impossible to examine some of the foreign periodicals.

A copy of the Zoological Record should be in the library of every working zoologist, and if more workers would subscribe for the volume or at least for the part in which they are specially interested, it would be a great help to the Zoological Society, who have assumed very considerable financial responsibilities in order to secure the continuity of this most invaluable Zoological Bibliography.

The complete volume or the parts can be obtained from the Zoological Society direct or from the publishers, Messrs. Harrison & Sons, St. Martin's Lane, London.

List of other Ornithological Publications received.

- MURPHY, R. C. Notes on American Subantarctic Cormorants. (Bull. Amer. Mus. N. H. xxxv. New York, 1916.)
- SHUFELDT, R. W. Owls, as regarded by the Scientist, the Agriculturist, and the Sportsman. (Wilson Bull. No. 92, Oberlin, 1915.)
- WITHERBY, H. F. The "British Birds" Marking Scheme. ('British Birds,' ix. London, 1916.)
- Avicultural Magazine. (Third Series, Vol. vii. Nos. 3-5. London, 1916.)
- Bird Notes. (New Series, Vol. vii. Nos. 1-3. Ashbourne, 1916.)
- British Birds. (Vol. ix. Nos. 8-10. London, 1916.)
- California Fish and Game. (Vol. ii. No. 1. San Francisco, 1916.)
- California Univ. Publs. in Zoology. (Vol. xii. Nos. 13 & 14. Berkeley, 1916.)
- The Condor. (Vol. xviii. No. 1. Hollywood, Cal., 1916.)

The Emu. (Vol. xv. pt. 3. Melbourne, 1916.)

The Irish Naturalist. (Vol. xxv. Nos. 1-3. Dublin, 1916.)

Messenger Ornithologique. (1915, No. 3. Moscow, 1915.)

Sarawak Museum Journal. (Vol. ii. No. 6. Sarawak, 1915.)

The Scottish Naturalist. (Nos. 49-51. Edinburgh, 1916.)

XIX.—*Letters, Extracts, and Notes.*

SIR,—In the recent edition of the ‘B. O. U. List of British Birds,’ *Acanthis linaria rostrata* is called the Greenland Redpoll. Coates, who described the bird, called it the Greater Redpoll, as does the A. O. U. Check-list, and though the bird may not be larger than *Acanthis hornemanni*, the massive beak gives it the appearance of size, and makes the name “Greater” descriptive. In the case of *Acanthis hornemanni*, the B. O. U. List calls it Hornemann’s Redpoll, the B. O. U. List of 1883 called it the Greenland Redpoll, as does the present A. O. U. Check-list, and between these common names there is nothing to choose except that uniformity between the British and American Lists is desirable.

May I suggest that in the next British List *Acanthis linaria rostrata* be called the Greater Redpoll, and I have little doubt that the A. O. U. would reciprocate in the next Check-list and call *Acanthis hornemanni* Hornemann’s Redpoll?

Now that *Stercorarius parasiticus* and *Stercorarius longicaudus* mean the same thing in both the B. O. U. and the A. O. U. Lists, it is perhaps not too much to hope for uniformity—if not in classification, at least in names—in future editions of both Lists.

I am, Sir,

267 Rusholme Road,
Toronto, Ontario.
January 1, 1916.

Yours, &c.,

J. H. FLEMING.

SIR,—An interesting point in connection with the birds of Grand Cayman Island (W. Indies) is that in no fewer than four of them the colour-variation from what may be

presumed to be the parent species is in the same direction. Alike in *Icterus bairdi*, *Amazona caymanensis*, *Dendroica vitellina*, and *Spindalis salvini*, when compared with *I. leucopteryx*, *A. cubensis*, *D. discolor*, and *S. benedicti*, the tendency seems to be towards a brighter, paler, and more yellow type of coloration.

A possible explanation may be the remarkable want of dense shade in the island. The woods are usually open, and the general effect at any time of the year is very much that of England in May. The soil, too, is, as a rule, the brightly coloured red kind so often found in limestone country—in the neighbourhood of Torquay, for instance.

Another explanation might perhaps be found in the fact that in Grand Cayman there are no resident Birds of Prey (except *Strix flammea*), so that once a bird is fledged and has, as a nestling, escaped the attentions of snakes, lizards, and mocking-birds, it has practically no enemies to fear, and can indulge with impunity in the tendency towards yellow feathers which, under certain circumstances, green and olive coloured birds (*e. g.* Canaries, Budgerigars) seem to have.

Much the same change in colouring is to be seen in the agouti, which, under the name of "rabbit," was introduced some twenty-five or thirty years ago from Central America, and according to the islanders was then grey. At the present time it is generally pale chestnut or about the colour of the European squirrel. It has multiplied exceedingly in the south and west of Grand Cayman, where, though undoubtedly eatable, it is now looked upon as a pest.

On the other hand, *Mus alexandrinus* seems to be always grey and *Mus musculus* ordinary mouse-colour. But the agouti is by no means as nocturnal in its habits as rats and mice are. Many of the "coloured" islanders have unexpectedly fair hair. I have never seen anywhere else the combination of really golden hair with a *café-au-lait* complexion. Of course, this may be due to quite other causes than those which affect the colouring of the island fauna, but it seems possible that the same reason, whatever

it may be, may account for the size of the people (6 ft. is about the average for the men both white and black, while 6 ft. 8 in. or more is not unknown) and of at least one of the birds, *Dendroica vitellina*, when compared with its possible progenitor.

Perhaps it may be found in the exceedingly healthy climate of Cayman. The human death-rate there is from seven to eight, probably as low as it is anywhere in the world, and life is easy for men and birds alike.

Yours faithfully,

The Hayes,
Chandler's Ford, Hants.
March 4, 1916.

T. M. SAVAGE-ENGLISH.

SIR,—In the last number of 'The Ibis' (October 1915, p. 789), I found a notice on my paper, "Description d'un nouveau genre et d'une nouvelle espèce de Pic, provenant du N.W. de la Rép. Argentine," where, without giving any explanation, is said: "It does not appear that Señor Dabbene has had an opportunity of examining the type or *other examples* of Cabanis's species, and we venture to suggest that it is unlikely that two distinct species of so large and well-characterised a form would inhabit the same locality."

I must remark that evidently the criticiser has not read entirely my article, where, on p. 81, I give the average of the dimensions of eight specimens of *Phlwotomus schulzi*, one of them shot by myself in Cordoba, the same locality where the type of Cabanis was obtained.

With this letter I send you a photograph of several specimens of *Ph. schulzi* which are preserved in the collection of the National Museum of Buenos Aires and one of the new species described, *N. shiptoni*. The other specimens of the last species that I have observed belong to the collection of Mr. Lillo of Tucuman, who has kindly lent them to me for examination.

With regard to the differences between *N. schulzi* and *N. shiptoni* that I have given in my paper, I believe they are of sufficient value to separate one from the other,

and I do not find it at all unlikely that both may be found in the same Province of Tucuman.

Just now, I have described in 'Boletin Sociedad Physis' an apparently new race, very similar to *N. schulzi*, with which it agrees in all characters, but is considerably larger.

This new race of *N. schulzi* has been recently obtained by Mr. Mogensen in Resistencia (Chaco Austral) on the right bank of the Parana River. I think that the occurrence of a race of this species so far towards the east is very interesting, while *N. schulzi* was known to inhabit only the centre and north-west of Argentine (Cordoba and Tucuman).

I am, Sir,

Yours, &c.,

ROBERTO DABBENE,

Museo Nacional de Buenos Aires.

January 7, 1916.

Curator of Birds, Nat. Mus. of
Natural Hist., Buenos Aires.

[We regret that we suggested in error that Señor Dabbene had not examined examples of Cabanis' species, but must still adhere to our opinion that it is unlikely two such closely allied species as *N. schulzi* and *N. shiptoni* should occur in the same locality.]

SIR,—Let me point out that in reviewing in 'The Ibis,' January 1916, pp. 180-181, our 'Ornithological Review' of 1914, you ascribe papers on *Caccabis chukar*, *Cyanistes cyanus yenisseeensis*, *Parus bokharensis*, and *Cuculus canorus subtelephonus* to Prof. P. P. Sushkin, whereas they were written by Mr. N. A. Zarudny.

Yours most truly,

Wesenberg, Esthonia, Russia.

January 27, 1916.

S. A. BUTURLIN.

The Annual General Meeting of the British Ornithologists' Union.—The Annual General Meeting of the B.O.U. for 1916 was held on March 8 at the Offices of the Zoological Society of London, Mr. Henry Munt, in the absence of the President, being in the Chair. There were thirty-nine Members present.

The Minutes of the last Annual General Meeting, and of the Special General Meeting held on January 12, 1916, were read and confirmed.

The Secretary read the following Report of the Committee for the past year:—

“The Committee regret that owing to the very heavy extraordinary expenditure during 1914–15 they have to report a further grave decrease in the funds of the Union. The accounts for the past year, which have been audited in detail by Mr. T. H. Newman, show a comparatively satisfactory result in so far as ordinary expenditure and receipts are concerned. The total receipts in 1915 were £736 5s. 0d. as compared with £731 4s. 10d. in the previous year, and the total payments amounted to £766 8s. 2d. as against £811 13s. 7d. in 1914. The balance carried forward to 1916 was £1 17s. 5d.

“The cost of ‘The Ibis’ has been reduced from £543 7s. 8d. in 1914 to £505 2s. 6d. in 1915, and in no item of routine expenditure has there been an increase calling for remark. We have, however, to face a further very heavy expenditure during 1916 on account of the Dutch New Guinea Supplement and the new General Index (1895–1912). On the 1st of January last we owed £268 1s. 6d. on account of work done for these two publications, and we estimate a further expenditure of about £150 before the Index is completed.

“A certain proportion of the cost of the B. O. U. List of British Birds will be recovered and a smaller proportion of the cost of the General Index, but we can expect to receive very little beyond such sums as the Dutch New Guinea Expedition Committee can eventually hand over to us towards the cost of the Supplement. The Secretary estimates, however, that with the increase in subscriptions the Union should be able to cover all expenses by 1919 and afterwards always be in a position to undertake any necessary extraordinary expenditure without incurring debt.

“The Annual Volume of ‘The Ibis’ for 1915, edited by Mr. W. L. Slater, is the fifty-seventh volume, and the third

of the Tenth Series. It contains 829 pages, and is illustrated with 5 coloured and 4 uncoloured plates and 14 text-figures.

“With regret the Committee report the deaths of the following Members since the last Annual General Meeting:—Dr. R. M. Barrington, Lord Brabourne, E. S. Cameron, P. T. L. Dodsworth, H. E. Dresser, C. M. Dyer, Hon. G. Legge, Capt. E. F. Penn, Sir A. W. Rücker, Col. Charles Stonham, Major C. H. T. Whitehead, R. B. Woosnam, and Hans Graf von Berlepsch.

“The following gentlemen have resigned:—H. B. Brooke, J. J. Dalgleish, H. B. Elton, J. R. G. Gwatkin, Richard Heywood, H. Le Strange, C. J. Leyland, Sir H. C. Monro, Wickham Noakes, W. H. R. Saunders, W. P. Westell, B. I. Whitaker, S. B. Wilson, Capt. J. B. Young.

“The names of C. P. Conigrave and Herbert Goodchild have been removed from the List of Members under Rule 6.

“The membership of the Union, and comparison with the previous five years, is as follows:—

	1916.	1915.	1914.	1913.	1912.	1911.
Ordinary Members...	420	441	433	425	420	419
Extraordinary „ ...	1	1	1	2	3	3
Honorary „ ...	9	9	7	8	9	9
Hon. Lady „ ...	8	6	6	6	6	4
Colonial „ ...	10	10	9	9	9	10
Foreign „ ...	19	20	19	20	20	19

“There are 15 candidates for Ordinary and 1 for Hon. Lady Membership.

“Under existing circumstances it has not been possible to progress with the General Index to ‘The Ibis’ for the years 1895 to 1912 so well as was anticipated, but the first half is now nearly all printed, and the remaining portion will be pushed on as rapidly as possible.”

The Statement of Accounts for the year 1915, previously circulated to Members, was submitted and approved, and a vote of thanks was accorded to the Auditor, Mr. T. H. Newman.

Mr. E. C. Stuart Baker was re-elected Hon. Secretary and Treasurer for the ensuing year, and Lord Rothschild was elected a Member of the Committee in the place of Mr. H. Munt, who retired by rotation.

The Rev. J. R. Hale and Mr. C. D. Borrer were appointed Scrutineers to superintend the Ballot.

The following fifteen gentlemen were elected Ordinary Members of the Union:—Ernest E. Adams, John P. Stephenson Clarke, Dr. Henry N. Coltart, Algernon J. Currie, Giuseppe Despott, Alfred Ezra, Capt. John M. Fal-kiner, I.M.S., F.R.C.S., Cyril Hopwood, Walter S. Millard, F.Z.S., Cyril W. Mackworth Praed, Bernard C. Thomasset, F.Z.S., Walter E. Wait, Walter J. F. Williamson, I.C.S., Charles M. Woodford, C.M.G., and Rag. Cav. Vittoria Zambra.

Miss Maud D. Haviland was elected an Honorary Lady Member.

On the recommendation of the Committee, Mr. W. L. Slater proposed "That ladies be admitted to Ordinary Membership of the B. O. U."; this was seconded by Mr. H. J. Elwes. Mr. C. D. Borrer and Dr. C. B. Ticehurst spoke against the motion, and then Mr. P. F. Bunyard moved an amendment, "That the question of ladies becoming Ordinary Members of the B. O. U. be held over until after the War"; this was seconded by Mr. G. Blaine.

After some discussion, in which, amongst others, Lord Rothschild, Mr. E. Bidwell, Dr. H. O. Forbes, Mr. H. D. Astley, and Mr. H. G. Alexander took part, the amendment was put to the Meeting and lost (10 in favour, 20 against). The original motion was then put and declared carried (20 in favour, 15 against).

The Rev. J. R. Hale then asked that future Meetings might not, as in the present instance, be fixed on Ash Wednesday, and the Secretary in reply explained that the fact had not been noticed until too late to make any alteration, or another date would certainly have been chosen.

Mr. D. Seth-Smith proposed and Mr. W. R. Ogilvie-Grant seconded a vote of thanks to the Zoological Society for the use of their offices and rooms during the past year. This was carried unanimously.

Lord Rothschild moved that a hearty vote of thanks be accorded the Chairman for the able manner in which he had conducted the proceedings in the unavoidable absence of the President. This was seconded by Mr. E. G. B. Meade-Waldo, and carried.

This closed the business on the Agenda, but as the Meeting was about to disperse, Mr. Elwes rose and moved the following resolution:—"That the name of H.M. King Ferdinand of Bulgaria be and hereby is removed from the list of Ordinary Members of the Union." The Chairman pointed out that as no notice of this motion had been sent previously to the Committee, and had therefore not been circulated to the Members with the circular convening the Meeting, he must rule it out of order. Col. H. W. Feilden opposed this ruling and seconded the motion, whereupon considerable discussion ensued, in which Messrs. E. Bidwell, S. Boorman, H. D. Astley, W. L. Selater, C. D. Borrer, Dr. H. O. Forbes, and Lord Rothschild took part. The Chairman then repeated his ruling, explained the procedure to be adopted, and regretted that he must adhere to it, although the sympathies of the Committee and himself were with the motion. He further stated that the Committee would feel bound to resign if his ruling were not accepted.

As the feeling of the Meeting seemed against accepting the Chairman's ruling, and further discussion at once arose on the matter, he placed the resignations of the Committee as a body in the hands of the Members present and left the Chair.

List of M.B.O.U. serving with H.M. Forces.—The following is a further short list of names to be added to those already printed in 'The Ibis' for October last year and January this year.

A summary of the previous and present list shows:—

	Previous lists.	April list.
Serving in the Navy.....	9	0
„ France	11	3
„ Egypt and Gallipoli	7	0
„ India	8	0
„ East and South Africa ..	3	1
„ the British Isles	37	0
Killed in action or died from illness.	5	2
Prisoner in Germany	1	0
	81	6
	—	—

Blackwood, G. G. 2nd Lieut., 10th Batt. Seaforth Highlanders, attached to 8th Batt. Was in France and accidentally wounded.

Haagner, A. K. Patrol Leader, No. 8 Patrol, Pretoria Civic Guard. In South Africa.

Penn, E. F. Capt., 4th Batt. Grenadier Guards, in France. Killed in action, Oct. 18 (see p. 345).

Russell, C. G. E. Capt., Bedfordshire Yeomanry. (Seconded for service as a Train Conducting Officer.)

Stonham, C. Col. R.A.M.C. Served in Egypt. Died of illness contracted on service, Jan. 31 (see p. 346).

Wenner, M. V. Private in the 20th (3rd Public Schools) Batt. Royal Fusiliers, subsequently Flight Sub-Lieut., Royal Flying Corps.

A Life of the late W. B. Tegetmeier.—Naturalists the world over will be glad to learn that a life of the “Grand Old Man” of the Bird World (W. B. Tegetmeier) is about to be published by Messrs. Witherby & Co. It is written by his son-in-law, Mr. E. W. Richardson, who was long associated with him in his literary and social life. The “Life” of the man who collaborated with Darwin; discovered the cylindrical origin of the bee’s cell; inaugurated the first Pigeon Flight in England; witnessed operations before chloroform was known; helped to found the Savage Club, and who lived through five reigns, can scarcely fail to be of absorbing interest.

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The wide scope and almost universal appeal of this delightful "Life" are indicated by the following list of a few typical Persons and Subjects dealt with therein:—

PERSONS:—King Edward VII.; George III.; Queen Charlotte; Darwin; Huxley; Sala; Lubbock; Lewis Carroll; Maeterlinck; Sir Walter Gilbey; Shelley; Cruickshank; Doré; W. S. Gilbert; the Broughs; Frank Buckland; Dr. Wallace; Tom Hood, Jr.; Henry Irving; Seymour Haydn; Victor Hugo; Pinero; Penley; Captain Scott; J. L. Toole; Artemus Ward; Tom Robertson; Whistler; Herkomer; Sir C. Wyndham; Yarrell; Edmund Yates; Harrison Weir; Frank Vizetelly; Mrs. Lynn Linton; Kemble; Jenner; German Reed; Mrs. Keeley; Millais, and many other interesting personalities.

EVENTS:—The Siege of Paris; the First Pigeon Flight in England; Use of Carrier-Pigeons for Lightships; the Discovery of the Cylindrical Origin of the Bee's Cell; Co-operation with Charles Darwin; Long connexion with the *Field*; Introduction of Anæsthetics and Automobiles; the Flogging and Execution of Criminals in Public; the Introduction of Decimal Coinage in England; of Cottages for Labourers; of Balloon Post and "Pigeongrams"; the Extinction of Garroters.

SUBJECTS:—Axolotls; Aeroplanes; Bees; Burglars; Cock-fighting; Mendelism; Mesmerism; Mail Coaches; Micro-photography; Newgate Prison; Okapi; Pallas's Sand-Grouse; Pheasants and Game Preserving; Pigeons; Poultry; the Savage Club; Snakes and Vipers; Sparrows; "Wireless"; Zebras.

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Members are requested to inform the **Secretary**, c/o The Zoological Society of London, Regent's Park, N.W., of any change of Address, so that the numbers of 'The Ibis' may reach them without delay.

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* * The aim of the authors has been to give a biographical account of each author or co-author of a separately published work, followed by a complete bibliography of published works or contributions to works, and of papers contributed to Journals (where such exceed one page in extent), bearing on British Ornithology.

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E. C. STUART BAKER,

Hon. Secretary.

Offices of the Zoological Society of London,
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July, 1916.



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THE IBIS.

TENTH SERIES.

VOL. IV. No. 3. JULY 1916.

XX.—*A List of Birds collected in Uganda and British East Africa, with Notes on their Nesting and other Habits.*—
Part II.* By V. G. L. VAN SOMEREN, M.B.O.U.

(Plates VIII.—XIII.)

Pitta longipennis.

♂. 5.vi. 13.

A fine male in good plumage was shot in the forest-undergrowth. It is decidedly rare.

Locality. Mabira Forest, in Uganda.

Hirundo rustica.

♂ & juv. 30.ix. 10.

Occurs as a migrant in considerable numbers, though adult birds have been obtained as late as June and July.

Locality. Kyetema, in Uganda.

Hirundo arcticincta.

Hirundo angolensis Boc. ; Reichenow, Vög. Afr. ii. p. 409 [part.].

♂ & 2 imm. 1.v. 12.

The Brown-throated Swallow is a common species, nesting from March to May, and again in October. Young

* For Part I. with Map (Pl. IV.) see pp. 193-252.

nestlings were taken in May, and young well able to fly in December. The eggs are like those of the Common European Swallow.

Localities. Kyetema and Busiro, in Uganda.

Hirundo smithi.

♂. 17. vi. 12.

♀. 13. xii. 14.

The little Red-capped Swallow is fairly common in British East Africa, but not in Uganda. We have taken the eggs in June, October, and December. The nest is an open cup, built of mud and lined with straws and feathers; it is usually constructed under the eaves of a building, or in caves or under bridges. The eggs, three to four in number, are pale pink, heavily spotted and blotched with Indian-red and liver-colour.

Localities. Sio River, Uganda border; Nakuru, Naivasha, and Nairobi, in British East Africa.

Hirundo puella.

♂ 1-2. 13. iii. 12; 12. vii. 09.

♀. 12. xii. 14.

This is one of the commonest species, usually found in townships and villages, and occasionally seen in the open acacia-country and along the lake-shore.

They are extremely tame and confiding. They construct nests like those of the House-Martin, but with a long tubular entrance. The eggs vary in colour. We have taken them from May to July, and in October and December.

Localities. Jinja, Kyetema, Busiro, in Uganda; Kisumu and Nairobi, in British East Africa.

Hirundo senegalensis.

♂ & ♀. 25. v. 10; 5. v. 09.

Very common. Breeds under bridges, in caves, and under eaves of buildings. The nests are usually found in May-July and October-January.

Localities. Kalwanga, Kyetema, in Uganda; Kisumu, in British East Africa.

Hirundo monteiri.

♂. 4. iv. 12.

An adult male with white spots on the outer tail-feathers is referred to this species.

Locality. Kyetema, in Uganda.

Hirundo emini.

♀ imm. 6. vii. 13.

This is a young bird in first plumage; it was taken in July, and nests and eggs in December.

Localities. Nairobi and Kyambu, in British East Africa.

Hirundo atrocærulea christyi.

Hirundo christyi Sharpe, Bull. B. O. C. xvi. 1906, p. 86 : Mabira Forest, Uganda.

♂ 1-2. 7. v. 12 ; 7. v. 12.

♀. 7. v. 12.

A rare bird in collections. This Swallow was seen in fair numbers in Uganda. It was nesting in May in nests like those of *H. puella*, lined with rootlets and feathers of all sorts. The eggs are pure white. These birds feed in flocks, flying low over the swamps, especially towards evening. They are sometimes met with on the outskirts of forests.

I have compared these birds with specimens from Natal, in the Tring Museum, and cannot see any reason for separating them from the southern birds. A male of *H. atrocærulea*, in the Tring Museum, has white spots on the outermost pair of tail-feathers.

Localities. Buziranjuvo and Mabira, in Uganda.

Psalidoprocne albiceps.

♂. 7. iv. 12.

♀ 1-2. 9. vi. 13 ; 6. x. 06.

The White-headed Martin is about evenly distributed in Uganda and British East Africa. In the Kavirondo and Embu districts it was common, frequenting the bush and scrub country. These birds fly low over the grass and bushes when hunting for food, and frequently perch on the top of

bush or grass-stem. They nest in holes in banks, the tunnel being about seven to fourteen inches in length, with a slight upward inclination. The nesting-chamber is lined with grass and a few feathers. The eggs are white, three to four in number.

These birds breed in June and in October. A female shot off the nest is uniform dark brownish black with an oily-green sheen; it has no white cap or throat. A second female has a grey head.

Localities. Bale, Mawokota, in Uganda; Embu and Kenia, in British East Africa.

Bradyornis pallidus murinus.

♂ 1-2. 12. iv. 13; 12. xii. 12.

Frequently met with in the scrub and acacia country, and in the open forest. They sit motionless on some low bush and fly out when they see an insect passing.

Localities. Londiani and Kisumu, in British East Africa.

Dioptrornis fischeri.

♂ & ♀. 14. vi. 12; 17. xi. 12.

A common species in British East Africa, frequenting the outskirts of forests, gardens, and scrub. They are most active in their search for insects just before sunset, especially when the white ants are fighting after a shower of rain. At these times they sit on the lowest branches of a shrub or on a low rock, and as the ants take flight they pounce down on them. When the light has almost gone it is a weird sight to see these grey shadows flitting low to the ground.

Nesting birds have been shot in May and June, and young taken in January and February and July.

Localities. Londiani and Nairobi, in British East Africa.

Melænornis pammelaina.

♂ 1-7. 14. xi. 10; 12. xii. 13; 29. iv. 10; 27. iii. 09; 13. v. 12; 14. xi. 10; 23. vii. 12; 15. v. 12.

♀ 1-5. 24. vii. 10; 3. iii. 09; 26. xi. 10; 13. v. 12; 13. v. 12.

Nestlings 2.

Two of these specimens collected in November have white rings round the eyes—they are male and female.

These birds nest in low bushes or in the comb of a banana bunch. The nest is composed of rootlets and twigs, and lined with fibres. The eggs are a dark reddish-brown or greenish-brown ground-colour, speckled with lighter brown or dark brown. These have been taken in April, May, and June. Young nestlings were procured in May. A bird in the change plumage from first to second, was shot in July; adult moulting birds in May—these moulted while still with young in the nest-stage.

Localities. Kyetema, Kitoma Salt Lake, Ankoli, Kabamba, and Jinja, in Uganda; Nakuru and Kisumu, in British East Africa.

Empidornis kavirondensis.

♂ 1-2. 17.iv.11; 17.iv.11.

♀ 1. 21.vi.12.

Not very common. They were breeding in June.

Localities. Ledgu's Camp, western Uganda; Kavirondo, in British East Africa.

Muscicapa grisola.

♂ 1-2. 4.xi.10; 28.xii.12.

♀. 4.xi.10.

Very common as a migrant. One specimen remained in my garden for over two months.

Localities. Lusasa, in Uganda; Nakuru and Nairobi, in British East Africa.

Alseonax lugens.

♂ & ♀. 7.xi.10.

A pair of these Grey Flycatchers was procured along with their nest and eggs in November. The nest was placed on the top of a stump which was jutting out from the middle of a small stream. It was built of rootlets and moss, and lined with fibres of bark and grass. The stump was moss-covered, so that the nest was very inconspicuous. The eggs, two in number, are whitish-olive,

speckled with fine reddish-brown and liver-coloured spots, mostly toward the larger end.

The birds were fairly tame. They frequent the more open forests.

Locality. Chambura River, Uganda.

Alseonax infulatus.

♂ 1 and ♀ 2. 2. x. 10; 15. vii. 12; 14. vii. 12; 20. xii. 12.

Quite a common species. We found these birds numerous along the papyrus swamp at Kisumu, where a pair was nesting in an old weaver-bird's nest; they had young just ready to leave the nest. They also nest in crevices in trees.

Young birds are heavily mottled above, but below the mottling is confined to the breast, the throat and abdomen being white as in adults or with faint black tips to the feathers.

Localities. Mjanji and Kikoma, in Uganda; Kisumu, in British East Africa.

Alseonax murinus pumilus.

♂ 1-3. 28. i. 12; 28. x. 12; 15. v. 12.

♀ 1-3. 12. v. 12; 28. x. 12; 28. i. 12.

Fairly common in the more open forests. They are remarkably tame, allowing one to approach to within a few feet. They build a small open nest of rootlets and grass-fibres. The eggs are very small, of an olive-white ground-colour, spotted with red-brown. Two or three are laid. The young are heavily mottled above and below. The nests have been found in May and July, and in December and January. Young in first plumage were taken in September.

Localities. Kyetema and Mabira Forest, in Uganda.

Alseonax brevicauda.

Muscicapa brevicauda O.-Grant, Bull. B. O. C. xix. 1907, p. 107: Yambuya, Belgian Congo.

♂ 1-2; imm. 1-2. 19. xii. 12; 8. xii. 14; 5. x. 14; 20. x. 14; 1. x. 14.

♀. 20. x. 14; 7. x. 14.

Met with in pairs in the open forest. Young birds in first plumage were shot in October. They are heavily spotted with pale ochraceous from crown to rump, the

spotting on the coverts being brighter. The throat to the lower breast has the white feathers edged with black. Birds in the second or intermediate plumage—that is, still retaining ochraceous tips and edgings to the secondary and tertiary coverts and buff edgings to the secondaries—were shot in October.

Localities. Mubango, Mabira, Busiya, and Kyetema, in Uganda.

Alseonax ansorgei.

Muscicapa ansorgei Hartert, Bull. B. O. C. xxv. 1910, p. 95: Ogowé River, Gaboon.

♂ 1-4. 14.x.13; 24.ii.14; 19.x.13; 27.ix.13.

♀. 23.vi.14.

Imm. 3.

This small dark grey Flycatcher was distinctly uncommon. It was found in pairs in the large forests.

Localities. Mabira, Bugoma, and Kasala Forests, in Uganda.

Pedilorchynchus stuhlmanni.

♂ 1-3. 17.x.14; 17.vi.12; 5.x.14.

♀ 1-4. 5.x.14; 8.x.14; 17.i.12; 10.x.14.

Stuhlmann's Flycatcher was seen in fair numbers throughout the large forests. They were breeding in June. A young bird in the second plumage was shot in October.

Localities. Magada, Mubango, Wabigenji River, Nagunga, and Mabira, in Uganda.

Artomyias fuliginosa.

♂ 1-2. 5.x.14; 8.x.14.

♀ 1-4. 8.x.14; 7.x.14; 10.ii.14; 7.x.13.

The Dusky Flycatcher, a bird of the forest, was seen singly or in pairs; they kept to the fairly open parts. We did not hear them making any sound.

Localities. Mabira, Mubango, and Kasala Forests, in Uganda.

Cryptolopha mackenziana.

♂. 17.xi.12.

This is not a common species. It was found in the under-

growth of the forest. At the time that it was shot it was holding a piece of bark-fibre in its bill, probably for nesting-purposes, as, on dissection, the testes were found to be large.

Locality. Londiani Forest, in British East Africa.

Chloropeta massaica.

♂. 17.i.14.

A single example of the Yellow Flycatcher was shot on the outskirts of the forest. It has quite a melodious warble.

Locality. Mabira Forest, in Uganda.

Chloropeta natalensis.

♂, and nestlings. 10.vi.14.

A pair nested close to my house in Nairobi, and a large series of photographs was obtained. The nest was built between the prongs of an upright stem of a wild heliotrope. The position was quite exposed. The nest was an untidy structure, composed of coarse grass-blades externally, finer ones inside, and grass-fibres as a lining. It was so deep that when the bird was sitting the tip of the bill and tail were the only parts of her visible.

The clutch consisted of four eggs, almost spherical in shape, of a pink colour with a few scattered liver-coloured spots and streaks over a matt surface. Young birds are very like *C. icterina* in colour, but browner above and paler below.

Locality. Nairobi, in British East Africa.

Stizorhina vulpina.

♂ 15; ♀ 7. Collected in every month in the year.

This large series shows no variation in plumage. These birds are common in the forests, where they keep to the tree-tops.

Localities. Mabira, Mubango, Kasala, and Dwimi Forests, in Uganda.

Megabias atrialatus.

♂ 1-4. 17.ix.12; 7.x.13; 5.ii.14; 31.v.10.

♀ 1-5. 19.vii.12; 20.v.14; 14.x.13; 14.x.13; 10.xi.12.

When comparing this series with birds from West Africa, I could see no difference in the males, but the females of the western birds were certainly more reddish on the back than any of my skins. These birds were met with in the forest and acacia country. They were nesting in April and June.

Localities. Mabira, Kyetema, Katendi, and Jinja, in Uganda.

Bias musicus.

♂ 1-3. 31. v. 10; 7. xi. 14; 7. iii. 12.

♀ 1-2. 7. iii. 12; 24. ix. 10.

These curious birds are not common. They were found nesting in March and in September. The nest is a shallow structure composed of fibres and rootlets, bound together with cobwebs. Two eggs are laid, of a dirty greyish-white ground-colour, speckled all over, but mostly at the larger end, with grey-brown and brown spots and blotches.

Localities. Mpamujugu, Mabira, Sezibwa, Katende, and Kyetema, in Uganda.

Hyliota flavigastra.

♂ 1-2. 6. ii. 09; 10. xi. 14.

♀ 1-2. 9. vii. 12; 18. iii. 12.

Not very common. They are usually seen in the forests. The bird collected in November is an immature one, and has the feathers of the mantle edged with ochraceous.

Localities. Kaina, Mabira, Hoima, and Jinja, in Uganda.

Batis senegalensis orientalis.

♂ 1-2. 28. xi. 10; 16. xi. 10.

♀ 1-3. 16. xi. 10; 13. vi. 12; 7. xi. 14.

Imm. 1. 26. xi. 10.

These birds were nesting in June and November. They build a small open nest of grass-fibres decorated with lichen. The eggs, two in number, are very small and of a creamy ground with brown spots, more abundant round the larger diameter. Sometimes the spotting is equally distributed over the surface. A young bird moulting from first to intermediate plumage was shot in November.

Localities. Chambura River, Toro, Kyetema, in Uganda.

Platysteira cyanea nyanzæ.

Platysteira cyanea nyanzæ Neumann, J. Ornith. 1905, p. 210: Bukoba, Uganda.

♂ 1-5. 3.ii.09; 4.v.12; 21.vii.09; 21.vii.09.

Imm. ♂ & ♀. 21.ii.12; 4.v.12.

♀ 1-6. 4.v.12; 18.x.10; 3.iii.09; 5.vii.09.

Nestlings. 3.iii.09.

These birds are found in the forests, frequenting the undergrowth. Their call is a series of loud clear whistles.

They nest in April, June, and also in November and December. The nest is a small cup-shaped structure, placed in a fork of a low tree. It is composed of fibres and spiders' webs, and adorned on the outside with lichen. The eggs, two in number, are creamy or pale olive-brown, with brown and purplish spots, the latter not well-defined; the spotting is most numerous at the obtuse end.

The nestlings are covered with soft woolly feathers of a blackish-grey colour with ochraceous tips. The under surface is white. As the young grow older they assume the intermediate plumage, which is very like that of the female, but the throat and crop-band are pale brown. If the bird be a male the brown is gradually replaced by white feathers on the throat and black on the crop; if a female, these parts become a darker brown. The upper surface changes to dark grey.

Localities. Jinja, Hoima, Sanga, Kyetema, and Mabira, in Uganda.

Diaphoraphyia castanea.

♂ 1-5. 9.xii.14; 6.ix.13; 8.x.14; 5.x.14; 5.x.14.

♀ 1-5. 16.v.12; 13.xii.11; 3.xi.13; 5.x.14; 11.v.14.

These are noisy birds when disturbed; they have a clear shrill whistle when alarmed, and have a habit of beating the wings together and making a clicking noise. They keep to the forest undergrowth. They were breeding in May.

Localities. Mubango, Mabira, Kyetema, and Nazigo, in Uganda.

Diaphoraphya jamesoni.

♂ 1-4. 17. i. 14; 28. vii. 12; 18. viii. 13; 27. viii. 12.

♀ 1-2. 14. ix. 13; 7. ii. 14.

Not uncommon in the undergrowth of the larger forests. Usually seen in pairs or small family-parties.

Localities. Mabira and Jinja, in Uganda.

Elminia longicauda.

♂ 1-3. 21. vii. 09; 1. vi. 12; 3. ii. 09.

Imm. ♀ 1. 21. vii. 09.

♀ 1-5. 6. v. 12; 24. v. 12; 13. ii. 09; 12. vi. 12.

Nestling. 1. vi. 12.

This pretty little Flycatcher is fairly common, and is usually to be met with in the open forests and plantations.

We found it nesting in April and June. It builds an open cup-shaped nest of fibres and grass, and covers the outside with lichen. The two eggs laid are of a greyish-white ground, spotted toward the larger end with grey-brown, most of the spotting being in the form of a ring round the larger diameter.

Nestlings are covered on the head and back with soft grey-blue feathers tipped with pale ochraceous. The throat and breast are greyish with a slight bluish tinge; the abdomen is pure white; the sprouting wing-feathers are like those of the adult bird, but are tipped whitish, as are also the coverts. This scheme of colouring is retained throughout the intermediate plumage.

Localities. Kabamba, Kyetema, Sebwe River, in Uganda.

Trochocercus kibaliensis.

Trochocercus kibaliensis Alexander, Bull. B. O. C. xix. 1907, p. 88: Kibali River, French Soudan?

♂ 1. 10. iii. 14.

♀ 2. 3. v. 14; 5. ix. 13.

This dusky Flycatcher is not common. It is a forest-species. We have not taken its nest.

Locality. Mabira Forest, Uganda.

Trochocercus nitens.

♂ 1-2. 17.v. 14; 10.x. 14.

♀ 1. 8.ix. 13.

This also is uncommon and a forest-bird, of which little is known.

Localities. Mubango and Mabira Forests, in Uganda.

Trochocercus reichenowi.

Trochocercus reichenowi Sharpe, Ibis, 1904, p. 630 : Fanti, W. Africa.

♂ 1. 9.v. 14.

♀. 10.x. 14.

This is a good species, being quite distinct as regards coloration and size.

Localities. Mabira and Kasala, in Uganda.

Tchitrea viridis. (Plate VIII.)

♂ 10. 1906-15, in every month.

♀ 6. 1906-14, in every month.

This series includes birds in every stage of plumage. There are two males with the whole of the under surface glossy blue-black. Eggs of *Chrysococcyx klaasi* and *C. cupreus* have been taken from nests of this species. These Flycatchers breed twice a year and are very often double-brooded.

Localities. Mabira, Jinja, Kyetema, Kagera, in Uganda; Nairobi, in British East Africa.

Tchitrea emini.

♂ 9; ♀ 8. Collected in every month of the year.

We have here dark birds and pale birds, and some females with cream-coloured abdomens. These birds are found in forests, more so than *T. viridis*. They were found breeding from April to June and from October to January. The nest is a small structure of fibres bound together with cobwebs and decorated with lichen. It is usually placed in an upright fork of a branch, fairly low down. The eggs, two or three in number, are pink in ground-colour, with red-brown spots and blotches, most of the spots being concentrated in the form of a ring round the greater diameter. We have taken the eggs of *Chrysococcyx klaasi* from the nests of this bird.



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TCHITREA VIRIDIS.

Localities. Mubango, Mabira, Kyetema, Dwimi River, in Uganda.

Coracina pura.

♀. 7.iv.13.

The Lesser Grey Cuckoo-Shrike was met with in British East Africa, but not in Uganda. They were seen in the forests.

The series in the Tring Museum from British East Africa, west to Lake Kivu, shows two distinct forms, those from the Kivu district being darker and smaller.

Locality. Nairobi, in British East Africa.

Campephaga nigra.

♂ & ♀. 22.vii.12; May 1913.

The Black Cuckoo-Shrike was seen in British East Africa and Uganda, but was more frequently met with in the former. They keep to the open forests and plantations. Several pairs frequented my garden at Nairobi; they are silent birds, thus differing from *C. phænicea*, which I found to be very noisy.

Localities. Kigwe and Jinja, in Uganda; Nairobi, in British East Africa.

Campephaga martini.

Campephaga martini Jackson, Bull. B. O. C. xxxi. 1912, p. 18: Nandi, B.E. Africa.

♂ 1-4. 23.vi.14; 4.xi.13; 9.viii.13; 8.x.14.

♀ 1-4. 19.x.13; 5.xii.13; 7.x.13; 14.x.13.

Imm. 2. 5.xii.12; 9.x.12.

Martin's Purple-throated Cuckoo-Shrike was found to be fairly plentiful in the forests. The males are not easily distinguishable from males of *C. quiscalina* or *C. petiti*; they, however, differ in the following points:—

	<i>C. petiti.</i>	<i>C. quiscalina.</i>	<i>C. martini.</i>
Bill	Narrow.	Very broad.	Short and narrow.
Purple of underside.	Throat, breast, and abdomen.	Throat, breast, and flanks.	Throat and narrow line on abdomen.

The females, however, differ to a greater extent :—

	<i>C. petiti.</i>	<i>C. quiscalina.</i>	<i>C. martini.</i>
Crown	Green.	Grey.	Grey to nape.
Back	Barred.	Uniform.	Uniform.
Rump & tail-coverts.	Barred.	Uniform.	Uniform.
Throat	Whitish, shaded yellow.	White.	White, finely barred.
Chest	Few bars on side, canary- yellow.	Uniform yellow.	Canary-yellow, barred finely all over.
Flanks	Uniform.	Uniform.	Barred.

Young *C. martini* in first plumage are very heavily barred, and differ from adult females in being washed with olive on the whole of the upper surface and in having the feathers tipped with white. The scapular feathers are barred with black and tipped white; the rectrices are pointed and are olive in colour with brighter edges, the tips with a few dark vermiculations. The outermost pair are pure yellow; on the outer web an irregular longitudinal black line, while the inner web has two wavy black lines for the terminal one inch. The primaries and secondaries are edged with bright yellow on the outer web and tipped with yellow; the coverts olive with a subterminal black bar and white tip; the secondary coverts the same, but with faint vermiculations in black.

A white superciliary stripe is present, and a black line passes through the eye from lores to ear-coverts; the ear-coverts are black with white centres; the throat greyish and finely barred; the rest of the under surface is yellow barred with black.

A bird in an older stage has the head greyer with no olive wash, the under surface brighter yellow, and the back less spotted.

Localities. Mabira, Bugoma, and Kasala Forests, in Uganda.

Campephaga hartlaubi.

♂ 1-3. 15. vii. 12; 7. vi. 13; 4. viii. 12.

Imm. 15. vii. 12.

♀ 2. 7. vi. 13.

This Cuckoo-Shrike was found in the scrub and acacia country, and also in the forest. It is not very common. Birds in moult were shot in June.

Localities. Sio River, in Uganda; Kisumu and Embu, in British East Africa.

Campephaga phœnicea.

♂ 1-3. 7.xi.14; 15.v.10; 1.v.12.

Imm. 7.xi.14.

♀ 2. 4.vi.12; 22.vii.12.

The Red-shouldered Cuckoo-Shrike was seen in the open forest and thick plantations. A nest with two eggs was taken in April. The nest reminded one of that of the Chaffinch; it was well covered with lichen. The eggs were creamy-green with purple spots and blotches. A young male in moult was shot in November.

One adult male has the red of the shoulder-patch extending to the tips of the secondary-coverts, thus the red area is double the normal size. The primary-coverts are also red.

Localities. Sezibwa River, Kyetema, Kirirema, and Kalwanga, in Uganda.

Eurocephalus rüppelli.

♂. 17.iv.11.

One adult male in soiled, but not worn, plumage was shot in the Nile Province in April.

Locality. Gondokoro, in Uganda.

Prionops talacoma.

♂. 26.iv.11.

Not common, a single specimen from the Nile Province.

Locality. Gondokoro, in Uganda.

Sigmodus retzii graculinus.

♂ 1-4; ♀ 2. 28.xii.14.

A flock of eight was seen in the forest, and six obtained. These birds have two distinct notes—one for alarm and the other more of a call. They are very noisy when shot at,

and if one is wounded the rest fly at it and peck it, all the time uttering loud cries. They are very vicious and bold at such times, and swoop down when one goes to pick the fallen bird up.

Young birds in first plumage have been shot in October. These birds can easily be distinguished from *S. r. tricolor* by the absence of white on the primaries, though a specimen in the Tring Museum has a white spot on the inner web of the third primary.

Locality. Kyambu, in British East Africa.

Nilaus massaicus.

Nilaus afer massaicus Neumann, J. f. Ornith. 1907, p. 363 : Donje Erok, German East Africa.

♂ & ♀. 21. xii. 11 ; 17. v. 10.

Both these birds agree with typical *N. massaicus*. They have a continuous, broad, pale chestnut band running from the breast-feathers covering the shoulders to the end of the flanks. This band does not meet over the breast. The bands on the wings are white.

These birds inhabit the bush-country.

Localities. Busoga, Unyoro, and Toro, in Uganda.

Nilaus erythreæ.

Nilaus afer erythreæ Neumann, J. f. Ornith. 1907, p. 361 : Eritrea.

♂. 22. iii. 12 ; 9. vii. 12.

I have studied the series in the Tring Museum, and have had to refer these two specimens to *N. erythreæ*. In this species the wing-line is buff, while the band on the flanks is very dark chestnut and broken—not continuous.

Localities. Jinja and Toro, in Uganda.

Pomatorhynchus australis emini.

♂ 1-3. 6. xi. 10 ; 14. x. 13 ; 30. viii. 12.

♀ 2. 6. xi. 10 ; ? . 09.

I cannot see any difference between *T. emini* and *minor*. Young birds are washed with greyish buff on the underside,



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TELEPHONUS AUSTRALIS DOHERTYI.

and do not possess the upper black edging to the superciliary stripe. The band across the chest is a dirty brown-grey.

Localities. Jinja, Mabira, and Kasala, in Uganda.

Pomatorhynchus australis dohertyi. (Plate IX.)

Telephonus australis dohertyi Neumann, J. f. Ornith. 1907, p. 370 : Escarpment, B.E. Africa.

♂ & ♀, and imm. 16. viii. 13 ; 9. viii. 12.

The bird from Kikuyu has been separated by Neumann, and differs from the preceding in being generally darker on the whole.

The birds nest twice a year, in May to July, and again in January. The nest is placed low down to the ground, and is usually well hidden. It is composed of rootlets and fibres of grass and bark, the whole being adorned on the outside with cobwebs. The two eggs, or sometimes three, are creamy pink with liver-red and purply-grey spots.

Locality. Kikuyu, in British East Africa.

Pomatorhynchus senegalus orientalis.

Pomatorhynchus senegalus (Linn.); Reichenow, Vög. Afr. ii. p. 547 [part.].

♂ 1-2. 26. ix. 11 ; 25. v. 10.

♀. 29. ix. 10.

These birds inhabit the scrub. Their call is a series of loud clear notes of varying pitch.

Localities. Toro, Mubendi, and Kalwanga, in Uganda.

Pomatorhynchus minutus.

♂. 4. x. 10 ; 25. iii. 14.

Juv. 27. v. 10 ; 24. ii. 12.

♀. 29. ix. 10.

The Black-capped Shrike was common. It was met with in the scrub and grass country. It was breeding in March and September. A nestling was obtained in May, and a bird, a few weeks older, in February. The nestling is very like an adult in colouring, but the crown-feathers are

mottled with ochraceous, and the two black scapular patches are represented by a few black feathers.

Localities. Sanga, Kalwanga, Mubombo, and Kyabalinga, in Uganda.

Nicator chloris.

♂ 1-6. 7. x. 13 ; 20. v. 14 ; 5. xii. 14 ; 14. i. 14 ; 4. ix. 13 ; 26. xi. 10.

♀ 1-2. 26. xi. 10 ; 14. x. 13.

This is a common forest-species. It frequents the undergrowth and the lower branches of the taller trees. A nest was obtained in June, composed of rootlets and fibres, and contained two eggs of a dirty creamy-pink, spotted and freckled with lilac-grey and darker grey, the surface glossy. Young birds were taken in July and September.

Localities. Jinja, Kasala, Kyetema, and Mabira, in Uganda.

Chlorophoneus nigrifrons.

♂. 25. viii. 14.

A male in good condition. Not common.

Locality. Nairobi, in British East Africa.

Chlorophoneus sulphureopectus similis.

♂ 1-5. 14. vii. 12 ; 14. vii. 12 ; 6. vi. 12 ; 4. viii. 12 ; 14. viii. 12.

♀ 2. 14. vii. 12.

I have examined the large series of birds in the Tring Museum, and can see little difference between birds from South and British East Africa.

This is a bird of the bush-country. Young birds were collected in July.

Localities. Jinja and Sio River, in Uganda ; Kisumu, in British East Africa.

Laniarius leucorhynchus.

♂ 1-8. 7. x. 14 ; 5. xi. 14 ; 30. vi. 14 ; 17. v. 13 ; 15. xii. 13 ; 5. xii. 13.

♀ 1-3. 5. xii. 13 ; 19. xii. 11 ; 6. ix. 13.

Imm. 2. 17. xi. 13.

The Black Shrike was met with in the forests, frequenting the thick undergrowth. Young, with horny-white bills, were obtained in November, and moulting birds in September. Females are not glossy, but dull black.

Localities. Mabira Forest, Chagwe, and Usoga, in Uganda.

Laniarius æthiopicus major.

♂ 1-4.

♀ 1-3.

Imm.

The Great Pied Shrike is found in forest and scrub country. It is bold and fearless. It preys freely on eggs and young birds, and, because of this, is chivvied at sight by all small birds, such as Finches, Tits, and Warblers. These Shrikes have beautiful bell-like notes, which they utter with wonderful effect. They are good ventriloquists, but two birds generally take part in the calls. They also make rather an unpleasant sound, which resembles the noise made when sharpening a scythe with a stone; it resembles the words "schrang, schrang." The first call can be imitated well by whistling a full-toned note by blowing the air out and then drawing it in. When uttering this call the bird stretches himself to his fullest extent, then retracts the neck.

We have taken the nest and eggs in May and in July. The nest is constructed of rootlets and fibres, and lined with grass-fibre. The eggs, two in number, are greenish buff freckled at the larger end with ash-brown and lilac-grey; the surface is semi-glossy. Young birds in first plumage were taken in August.

Localities. Mubendi, Kyakasengula, Kikoma, Kyetema, and Jinja, in Uganda.

Laniarius erythrogaster.

♂ 1-2.

Imm. 2.

♀ 1-2.

The Crimson and Black Shrike was met with in the scrub

and acacia country. It was more often heard than seen. It has a loud full-tone whistle, which it utters from the depths of a thick bush. These Shrikes are very inquisitive birds, and creep to the outer branches of a bush to obtain a view of anything strange that is passing, but, if alarmed, they make a dive into the midst of it and remain perfectly still, or make off from the opposite side to which danger is presenting.

We found the nest of this bird in a low thick thorny bush; it was made of rootlets, interlaced with grass, and lined with fibres and very fine rootlets. The eggs are pale bluish green in ground-colour, spotted with ash and greyish.

Breeding-birds were shot in May, young in nest-plumage were caught in January, and young in change-plumage in July. Young in first plumage are heavily barred on the under surface, which is ochraceous, and the feathers of the upper side are edged and tipped with yellowish white.

Localities. Chagwe, Lake Albert, Kibero, Tondola, and Kalwanga, in Uganda; Kisumu to Kibos, in British East Africa.

Laniarius jacksoni.

♂ 1-5. 31.viii.12; 15.x.14; 17.vi.12; 15.x.14.

Imm. ♀ ♂ 2. 10.ix.12; 8.ix.13.

♀ 1-3. 31.viii.13; 10.ix.13; 10.iii.14.

Jackson's Bush-Shrike was met with in pairs in the forest and in the overgrown native plantations. It is not a common species.

Birds in moult were collected in March, October, and September. The length of wing varies from 76-80 in males and 73-75 mm. in females.

Two young birds in changing plumage were collected in September. They present interesting features which point to their close affinity to the genus *Chlorophoneus*. There is little sign of white on the forehead, the crown is blackish grey merging into the black of the nape and the dark grey

of the back, which is strongly washed with olive-green. The rump and tail-coverts are grey washed with olive; the rectrices blackish brown washed with olive and with olive edges. All except the two centre ones are tipped with yellowish. The superciliary stripe is indicated by a narrow line of white; the ear-coverts are black with a few barred feathers. The chin and throat are white, the breast heavily washed with sandy-buff, paling towards the abdomen. The under tail-coverts are whitish, so also the flanks—these are faintly barred. The under wing-coverts and margin of inner web of the wing-feathers are pale whitish yellow. The bastard-coverts bright yellow. The scapulars are grey with an olive tinge; lesser coverts grey broadly edged with olive; secondary and primary coverts grey, edged with olive and tipped with sandy; secondaries and primaries blackish brown, edged on the outer web with olive and tipped with whitish, the white being separated by a black line.

Localities. Kyetema, Mabira, Mubango, and Magada, in Uganda.

Dryoscopus malzacii nyanzæ.

Dryoscopus cinerascens Hartl. ; Reichenow, Vög. Afr. ii. p. 596.

♂ 1-6. 24.ii.12; 22.ii.12; 15.iii.12.

♀ 1-2. 17.iii.12; 15.ii.12.

The Grey-rumped Bush-Shrike is a common species, frequenting forest, scrub, and bush country. It is a noisy bird.

Nests and eggs have been taken from March to July, and in December and January. The nest is usually built in a low bush, but I have taken one fifty feet up. It is composed of rootlets and bark-fibres, to which are added bits of lichen and cobwebs. The eggs, usually two in number, are greyish white, spotted and streaked with brownish grey and grey, mostly about the larger end.

Localities. Banga, Kabulamuliro, Kirrilema, Kiriri, and Mabira, in Uganda.

Dryoscopus cubla suahelicus.

Dryoscopus cubla hamatus Hartl. ; Reichenow, Vög. Afr. ii. p. 594.

♂ & ♀. 1.i.14.

A pair obtained in the forest at Kikuyu were in breeding-condition. A nest was found in December; it was composed of rootlets and fibres and decorated in a similar fashion to that of *D. m. nyanzæ*, but the whole structure was more carefully hidden. The eggs are very similar to those of the preceding species, but are smaller. The birds have an interesting way of collecting bark-fibre: having selected a suitable dead creeper, they proceed to loosen the bark at a point where a lateral tendril has been, and, having worked a piece loose, one bird will seize it in its bill and give it a tug; as the bark becomes loosened it shortens its hold, hopping to the point of attachment. By several backward jerks of the head the strand is loosened, bit by bit, and when about six inches long it is seized firmly in the bill and the bird flies off. Very often the strand refuses to come away, and the bird, still holding on, hangs in mid-air; by a rapid swing of the body the fibre is caught in the feet, the strand is then seized at the point of resistance in the bill, and the feet are placed on the branch; then, by throwing the body backwards and straightening the legs, the fibre is pulled free and the bird flies off. During the whole of this performance the bird utters an incessant loud and clear whistle. When both birds are at the nest, there is much displaying and calling, especially on the part of the male, who erects the tuft of downy feathers of the rump into a fluffy ball on the back.

Localities. Kyambu, Nairobi, and Escarpment, in British East Africa.

Lanius collaris humeralis.

♂ 1-3. 29.vii.06; 7.ii.11; 14.xi.10.

♀ 1-2. 29.vii.06; 15.vi.14.

Imm. ♀. 9.iii.12.

The Fiscal Shrike is common everywhere in Uganda and British East Africa. Nearly every garden has its pair of "Bull-heads."

Nests and eggs are found in practically every month of the year.

The birds are very destructive to little birds, such as Grassfinches. I have seen as many as six, out of a small flock of about fifteen, captured and killed and stuck on the sharp points of a sisal bush. Small rodents, such as mice, are frequently taken.

The nest is composed, for the most part, of twigs, rootlets, and grass-fibre, but all sorts of rubbish are also added, such as string, bits of felting, hair, and bits of cloth. The eggs, generally three or four, are a dirty creamy-white with brownish-red and grey-lilac spots.

Localities. Kyetema, Jinja, Sesse Isles, Kalwanga, and Toro, in Uganda; Nakuru and Nairobi, in British East Africa.

Lanius excubitorius.

♂ 1-3. 9. vi. 10; 3. v. 10; 24. v. 10.

♀ 1-2. 9. vi. 12; 21. vii. 10.

Imm. ♀. 9. vi. 12.

This Great Grey Shrike was met with in pairs in the scrub and acacia country. They are fond of sitting on some prominent twig or tree-top, where they can command a view of the surrounding country. They were breeding from May to July, and in December. The nest is composed of rootlets and twigs interlaced, and lined with grass and other fibre. The eggs, two in number, are creamy-pink with red-brown spots and greyish underlying markings, all towards the larger end.

Nestlings, taken in July, do not differ from adults in colouring to any great extent, but have the feathers of the crown, back, and rump barred with fine black markings. The breast is faintly barred.

Localities. Katwe, Namberize, and Kalwanga, in Uganda; Kisumu and Kano, in British East Africa.

Lanius minor.

♂. 1.v.10.

The Lesser Grey Shrike was seen in the open grass and acacia country, singly or in pairs. It is not common.

Locality. Kibanga, in Uganda.

Lanius mackinnoni.

♂ 1-2 & imm. 28.ix.10.

This is not a common species. It is occasionally met with on the outskirts of forests and in the acacia-country.

Young in the first plumage were taken in June. These birds build their nests, fairly low down, in thorny bushes. They are composed of rootlets and twigs, and lined with fibres. The eggs are buff in ground-colour, spotted and streaked with ash and grey-brown. Two are usually laid.

Localities. Mubendi, Mabira, and Kyetema, in Uganda.

Lanius senator senator.

♂. 22.ii.14.

A single specimen of this species, in full, though soiled, plumage, was shot in the forest.

Locality. Mabira, in Uganda.

Lanius collurio.

♂ & ♀. 8.xii.10; 12.ix.14.

A pair in adult, but worn, plumage were shot in December and September.

Localities. Mabira and Katwe, in Uganda.

Corvinella corvina affinis.

Corvinella corvina (Shaw); Reichenow, Vög. Afr. ii. p. 629 [part.].

♂ 1-2. 26.iv.11; 18.ii.12.

Nestling. 18.ii.12.

Not very common, they frequent the acacia-country. A nest with four young was taken in February; it was composed of twigs and rootlets, lined with grass-fibre. The young are very like the adults in the general scheme of colouring.

Localities. Nile Province and Ledgu's Camp, in Uganda.



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CORVUS SCAPULATUS.

Corvus scapulatus. (Plate X.)

♂ & ♀. 13.iii.10.

Found nesting in March and May. The eggs are green or verdigris-green in ground-colour, with brown, grey-brown, and purply spots. These birds are common everywhere. They are great scavengers.

Localities. Kyetema, in Uganda; Kisumu, in British East Africa.

Rhinocorax affinis.

♂. 17.vi.13.

Seen in the Nile Province.

Locality. Gondokoro, Uganda.

Heterocorax capensis minor.

♂ & ♀. 15.xii.13.

Seen, in considerable numbers, frequenting the newly burnt grass-lands, where they pick up birds, rodents, and locusts which have perished in the flames. They were found nesting in single pairs in the acacia-country. The nest was a large structure, built of twigs and grass, and lined with a thick felting of goat's hair. The eggs are salmon-coloured with liver and lilac spots and blotches. There were three in the clutch.

Locality. Elmenteita, in British East Africa.

Corvultur crassirostris.

♂. 10.ii.11.

A single specimen of the Thick-billed Raven was procured. They are not common, and keep pretty well to the dry acacia-country.

Locality. Toro District, Uganda.

Dicrurus afer.

♂ 1-2. 9.x.06; 19.vii.10.

♀ imm. 27.vi.12.

The Pale-winged Drongo-Shrike was met with in the open acacia-country or in native cultivations. They usually perch high up on the top of some convenient tree, but when the

white ants are in flight they select a more lowly perch, from which to capture the insects as they go past. These birds sometimes move into the forests. One sees them in attendance on grass-fires.

A nest of this species was found in June. It was made of rootlets and lined with fibres and hairs. The eggs are light brick-red in ground-colour, with spots of a darker brown intermixed with yellowish spots. Young in change-moult, from first to second plumage, show signs of pale whitish edgings to the feathers of the under surface.

Localities. Kyetema, Buddu, and Kikoma, in Uganda; Kisumu and Nairobi, in British East Africa.

Dicrurus coracinus.

♀ 1-4. 22.vi.14; 10.xi.14; 22.vi.14; 5.xi.14.

Imm. ♂. 7.xi.14.

♀ 1-3. 19.ix.13; 14.ii.12; 10.iii.14.

Imm. ♀. 22.v.14.

The Western Black-winged Drongo was met with in the forest-clearings. In habits it resembles the Pale-winged form. Young birds were shot in May and November—these have no white tips to the feathers on the under side (*cf.* preceding species).

Localities. Sezibwa River, Kyetema, Kasala, and Mabira, in Uganda.

Oriolus oriolus.

♀. 22.ix.12.

A single female was shot the day it arrived in my garden. Several others appeared the following day and remained for a few hours, after which they proceeded in a south-westerly direction.

Localities. Nairobi and Nakuru, in British East Africa.

Oriolus larvatus rolleti.

♂ 1-3. 23.iii.10; 22.v.10; 28.iii.12.

Nestling 1. 10.vii.13.

These birds were seen in pairs in the forests and plantations. They have a loud clear whistle, which they utter

incessantly while at rest or on the wing. They are especially noisy when the breeding-season comes on. A nest was found in February. A nestling was caught in March. The upper surface is golden yellow-olive, the feathers of the crown, back, and rump have brownish centres, thus giving the bird a mottled appearance. The upper tail-coverts are bright yellow, the rectrices are black tipped with cadmium-yellow, except the two centre ones, which are olive-green tipped with yellow. The sides of the head are dull black; on either side of the neck there is a bright yellow patch; on either side of the throat, which is dirty yellow, is a black line. The feathers of the breast and abdomen are pale yellow, each with a dark shaft-stripe, which is clubbed at the end. The wing-feathers are dull black edged with olive-yellow, the primaries and a few secondaries are darker black edged and tipped with white. The wing-measurements for adults are 130-140 mm.

Localities. Kikoma, Nakaina, Kabulamuliro, in Uganda; Nairobi, in British East Africa.

Oriolus larvatus lætior.

♂ 1-6. 23. vi. 14; 7. v. 14; 26. vi. 12; 21. xii. 13; 24. ii. 14; 1. v. 14.

Imm. 2. 14. x. 14; 1. v. 14.

♀ 1-4. 14. x. 13; 5. v. 14; 14. xii. 11; 2. x. 13.

The Yellow-collared Oriole was found to be very common in the forests in Uganda. Young in first plumage were shot in October; they show no signs of a black head. Moulting birds were shot in May.

Localities. Mabira, Kyetema, and Kasala, in Uganda.

Oriolus percivali.

Oriolus percivali O.-Grant, Bull. B. O. C. xiv. 1903, p. 18: Kikuyu, B.E. Africa.

♂ 1-2. 17. xi. 12; 14. vii. 13.

♀. 17. xi. 12.

Percival's Oriole was met with in the forest and in the acacia-country. It was seen in fair numbers. Birds from

the Kavirondo country are larger and very much richer in colouring than those procured in Kikuyu.

Localities. Kavirondo, Embu, and Kyambu, in British East Africa.

Buphaga africana.

♂ 1-2. 10. vi. 13 ; 5. vi. 14.

We did not find this species so common as the next, though it inhabited the same sort of country.

Localities. Nakuru and Lumbwa, in British East Africa.

Buphaga erythrorhyncha.

♀ 1-3. 22. vi. 12 ; 20. vii. 12 ; 7. vii. 12.

♀ 1. 20. vii. 12.

The Red-billed Oxpecker was common in the Kavirondo country. They were in flocks of twenty or more. Each flock has its own herd of cattle on whose backs they feed. They were breeding in June and July. Two birds from Uganda are very dark and are moulting in pale feathers.

Localities. Jinja and Kyetema, in Uganda ; Kisumu, in British East Africa.

Perissornis carunculatus.

♂. 23. ii. 11.

♀. 1-2. 23. ii. 11 ; 20. vii. 12.

The Wattled Starlings were seen in large flocks, sometimes in company with *B. erythrorhyncha*. They feed largely on grasshoppers and locusts, and also on fruits. They were seen in the scrub-country. A young moulting bird was collected in October.

Localities. Kabaleka and Jinja, in Uganda ; Kyambu, in British East Africa.

Spreo superbus.

♂ 1-3. 17. iv. 11.

Imm. ♂. 17. iv. 11.

This beautiful little Starling was seen in the Nile Province first and, later on, in British East Africa. They go in flocks or pairs. We found them commonest in the scrub-country.

They were tame and confiding. A young bird in first plumage was shot in April.

Localities. Kiriba's to Gondokoro, in Uganda ; Machakos and Chania, in British East Africa.

Cinnyricinclus leucogaster.

♂ 1. 14.x.13.

Imm. ♂. 14.x.13 ; 15.xi.13.

The male is in fine fresh plumage and has no trace of white on the outer tail-feathers ; all the rectrices are present. Reichenow gives Nandi as the furthest known south-east limit for this bird.

Locality. Mabira Forest, Uganda.

Cinnyricinclus verreauxi.

♂ 1-8 ; ♀ 1-4. Collected in all months of the year.

These birds are to be seen in large flocks of twenty to thirty individuals, frequenting the ficus-trees in the forests. Young in first and in moulting plumage were collected in August and December.

A common species. The plumage changes from glossy blue to purple, through age and wear.

Localities. Kivuvu, Mpumu, Kabaleka, Kagera River, in Uganda.

Lamprocolius purpureiceps.

♂ 1-3. 9.ix.13 ; 7.v.14 ; 7.x.13.

♀. 27.ix.13.

This West African Starling was met with in the great forests. The males are in fine plumage. The female had a large ovary. Reichenow gives the distribution as West Africa, Cameroon to Congo and lakes.

Localities. Mabira and Kasala Forests, Uganda.

Lamprocolius chalybeus massaicus.

Lamprocolius chalybeus (Hempr. & Ehr.) ; Reichenow, Vög. Afr. ii. p. 687 [part.].

♂ 1. 15.i.13.

Imm. 20.iv.13.

This is the common Glossy Starling of British East Africa. It is found in the game-country, in towns, and native villages.

These birds are good scavengers. We have found their nests in trees in January and July. The eggs are blue. Young in first plumage were secured in March. They are very much duller than adults. These Starlings do well in captivity.

Localities. Nairobi, Escarpment, and Kenia, in British East Africa.

Lamprocolius sycobius.

♂. 21.vii.10.

One specimen of this species was obtained. They are not so very common. We found them in the acacia-country, in small flocks or pairs. Reichenow gives the distribution as Mombasa to the Transvaal and Mossamedes.

Grauer procured these birds at Lake Kivu and on the Kagera River, and *L. s. massaicus* on the Rusisi River, between Kivu and Tanganyika.

Localities. Nambirize and Buddu, in Uganda.

Lamprocolius splendidus glaucovirens.

♂ 1-3. 20.viii.06; 16.viii.06(?); 16.viii.06.

♀. 7.i.14; 24.iii.10.

This Glossy Starling is common in the great forests. They are wild and difficult to approach in the open, but in the forest they can be obtained with great ease. Like other Starlings these birds migrate from place to place, according to the abundance or scarcity of food in any one place. They are very partial to the wild fig. These birds are strong flyers, and make a noise like the sound of an express train dashing through a station as they pass from one feeding-ground to another. Birds were moulting in August. Eggs of this species were taken from holes in trees in March.

Localities. Singo, Bale, Mabira, and Kabulamuliro, in Uganda.

Lamprotornis purpuropterus.

♂ 1-2. 28. ix. 10; 17. iv. 11.

♀. 28. ix. 10.

The Lesser Green-headed Purple Starling was seen in fair numbers in the acacia-country. A nest containing two eggs was taken in April. Young birds were shot in June. These Starlings are quite musical.

Localities. Singo, Mabendi, and Kariba's Camp, in Uganda.

Dinemellia dinemelli.

♂ 1-2. 17. iv. 11.

Both these specimens are in worn condition, especially about the abdomen. In one specimen the upper and under tail-coverts are orange-yellow — not bright orange-red. Common in the acacia-country. Wings 112 mm.

Localities. Kariba's Camp, Nile Province, Uganda.

Plocepasser melanorhynchus.

♂ 1-3. 22. x. 10; 5. iv. 11; 5. iv. 11.

♀. 22. x. 10.

Fairly common. They were nesting in April in the Nile district, in June in Embu, and we have also taken nestlings in March. Birds in first plumage were seen in July and January. They build large, untidy nests of grass; the eggs are pink with reddish spots.

Localities. Bukurungu and Kariba's Camp, Uganda.

Malimbus rubricollis centralis.

♂ 1-7. 17. i. 14; 25. vi. 14; 7. iv. 11; 1. iii. 12; 27. iv. 12; 7. v. 14; 15. xii. 13.

♀ 1-7. 17. i. 14; 25. vi. 14; 5 xii. 13; 27. iv. 12; 1. iii. 12; 5. xii. 13; 31. v. 12.

A large series was collected. A male changing from the first plumage to adult was shot in April. The first dress is similar to the adult female's. These birds nest in single pairs at the end of a branch of some tall tree. The nest is an

untidy structure, composed of creepers and grass-blades; it is of the usual Weaver type. The eggs are large and pure white. Three nests were taken and all contained white eggs. They breed in April and May.

Localities. Kasala, Mabira, Namwave, Magada, and Kivuvu Forests, in Uganda.

Ploceus (Othyphantes) reichenowi.

♂ 1. 4.xii.12.

♀ 1-3. 4.xii.12; 20.vi.13; 15.v.14.

Reichenow's Weaver is common. It goes in pairs—not flocks, like most Weavers. These birds do not nest in colonies, but in single pairs—two pairs at the very most might occupy one tree. It is a fact that there are usually many nests on the one tree, but only one will be occupied. The other nests are either old ones or spurious nests built by the male to while away the time while his mate is sitting. These birds build high up or low down, but generally in the vicinity of water. The nest is composed of grass and lined with fine grass-fibres. The eggs vary from white to greenish spotted with liver-colour. They have been found breeding from March to July, and from November to December and January. Young were taken in June, May, and November. In general appearance they resemble females, except that the dark feathers of the back are edged with olive.

Localities. Nakuru and Nairobi, in British East Africa.

Ploceus (Othyphantes) stuhlmanni.

♂ 1-3. 30.iv.12; 25.i.12; 26.ix.11.

♀ 1-2. 25.i.12; 26.ix.11.

Stuhlmann's Weaver is similar in habits to the preceding. It was found nesting in April and September, and frequents the more open forests. A male shot in January is moulting from its off-plumage, which is like the female's, into its breeding-plumage.

Localities. Kyetema, Kyakasengula, Mohokya, in Uganda.

Ploceus (Hyphanturgus) stephanophorus.

♂ & ♀. 22.vii.12; 20.i.14.

This is rather a rare forest-species. Both birds are in fresh full plumage.

Localities. Sio River and Mabira, in Uganda.

Ploceus (Hyphanturgus) nigricollis.

♂ 1-4. 19.x.13; 31.v.12; 3.vii.12; 6.xii.14.

Imm. 5.xii.14; 14.ii.12.

♀ 1-10. Collected in every month except January.

This large series shows the females in breeding condition to be brighter than those shot during the off-season. Young birds are like females, but have the crown, back, and rump washed with olive, and the under surface duller yellow; the bill is pale horny-brown, yellowish on the base of the lower mandible. The nest of this species is retort-shaped, with long tubular entrance. The eggs vary in colour to an extraordinary extent, from white to blue, pink or red-brown, spotted with liver and red-brown, or uniform.

Localities. Mabira, Kasala, Kyetema, and Jinja, in Uganda.

Ploceus (Hyphanturgus) ocularius suahelicus.

Ploceus ocularius suahelicus Neumann, J. Ornith. liii. 1905, p. 39: Usambara, G. E. Africa.

♂ & ♀. 2.xi.14; 20.iv.13.

Two examples of this subspecies were obtained. They build retort-shaped nests, with long tubular entrances, of rootlets and grasses, and lined sparingly with fine grass. The eggs are large and white or bluish white, with ash-grey or brownish spots. The nest is usually suspended from the end of a free swinging branch of a thorny acacia. Nests with eggs or young have been taken in June, July, and November.

Localities. Kisumu, Kyambu, and Nairobi, in British East Africa.

Ploceus (Hyphanturgus) ocularius crocatus.

♂ 1-3. 21. iv. 13 ; 8. vi. 12 ; 8. vi. 12.

♀ 1-2. 13. v. 12 ; 27. xii. 11.

This subspecies is rather more orange-golden on the head than the preceding, but they are very closely allied. They inhabit the acacia and scrub country. We found them rather timid. They were breeding from April to June. The nest is similar to that of the preceding species. The eggs vary from pure white to blue or pale blue-green, with grey, pale brown, and blackish spots.

Localities. Kyetema and Jinja, in Uganda.

Ploceus (Hyphanturgus) aurantius rex.

Ploceus aurantius rex Neumann, Bull. B. O. C. xxiii. 1903, p. 12 : Entebbe, Uganda.

♂ 1-2. 31. vii. 06 ; 30. vii. 06.

♀ 1. 27. vii. 12.

This Golden Weaver is not common, though it is found all along the northern shores of Lake Victoria. We noticed them breeding on the Sesse Islands. They build a retort-shaped nest of grass with a short tubular entrance. The eggs are pale blue, green, or sometimes reddish, with lilac and pale brown spots.

Localities. Jinja, Entebbe, and Sesse Isles, in Uganda.

Ploceus (Melanopteryx) nigerrimus.

♂ 1-10 ; ♀ 1-3. Collected throughout the year.

A large series of this common bird was collected. They are very partial to palms as nesting-sites, and by the time the nesting-season is over there is not a single palm-leaf left. The males arrive at a chosen site first, and are then followed by the females.

They frequently build on the same palm or tree as the Yellow Weaver, *P. femininus*. The nest is retort-shaped, but with practically no tubular entrance. The eggs are invariably blue, either bright or pale. We have an egg which is

very pale—almost white. The nesting-season is from May to July and December and January.

Young birds in all stages of plumage were collected. When the birds are not breeding they would seem to frequent the forests, rather than the open country. We have seen these birds hawking for insects in a manner similar to that of a Flycatcher.

Localities. Kyetema, Mabira, Bwezu, Dwimi River, Magada, and Buziranjuvo, in Uganda.

Ploceus (Melanopteryx) interscapularis.

♂ 1-5. 9.iv.12; 2.v.14; 15.vi.12; 14.vi.12; 22.iv.12.

Imm. 25.viii.14.

♀ 1-4. 3.ix.13; 30.vi.14; 15.vi.13; 7.x.13.

This rare forest Weaver has been described under two different names: Reichenow naming the female *P. interscapularis*, and Ogilvie-Grant the male *P. mpangæ*. From the series before me and the descriptions given of these hitherto unique specimens, it is quite easy to see that one species has received two names. Reichenow's name comes first and must stand.

I have described the habits, nest, and eggs of this species in the 'Journal of the East African and Uganda Natural History Society,' vol. iv. 1913, p. 76.

The males are like *P. tricolor* Hartl. (not *castaneofuscus*, as stated by Neumann in Ornith. Monatsber. xxii. 1914, p. 95) but are smaller, and the yellow interscapular patch is narrower and paler. The females are similar to the males, but the chestnut of the breast and underparts is replaced by black with a very faint tinge of brown. Young males are like females, but the under surface is strongly washed with brown, while the bill is horny-brown—not black, as in adults. The nest is constructed of rootlets and fibres and is loosely woven; the eggs are pure white.

Localities. Kyetema, Mabira, and Kasala Forests, in Uganda.

Ploceus (Melanopteryx) weynsi.

♂ 1-5. 27.viii.11; 17.vi.14; 22.vi.12; 4.xii.03;
10.xi.14.

♀ 1-2. 7.x.14; 17.vi.14.

This is another somewhat rare species which is found in the large forests. They breed in June and July, but we have not succeeded in finding their nests. Young birds have been shot in November and a young bird in change-plumage in December. A male shot in May is in full moult. Females are rare in collections.

Localities. Mubango, Mabira, and Mpumu Forests, in Uganda.

Ploceus (Hyphantornis) femininus.

Hyphantornis feminina O.-Grant, Bull. B. O. C. xxi. 1907, p. 15: Ruwenzori.

♂ 1-4. 26.iv.12; 12.iv.12; 6.ix.10; 16.vi.12.

Imm. 2.

♀ 1-4. 27.iv.12; 6.ix.10; 29.iv.12; 12.iv.12.

This large Weaver is fairly common, nesting in colonies with *P. nigerrimus*. They had eggs in March and April and again in October. The eggs are large, and of a greenish blue with liver-brown spots scattered over the larger end.

Localities. Kyetema, Kyamune, and Kivuvu, in Uganda.

Ploceus (Hyphantornis) nigriceps.

♂ 2 & ♀ 2. 15.vii.13.

This species is fairly common in British East Africa, but we have not met with it in Uganda. They were nesting in May and June and in February. The eggs are bluish green, whitish, or blue, with brown and greyish spots. The nest is of the usual short-tubed type. This species nests in colonies. The females are very like female *P. spekei*, but are more yellowish on the underside and on the crown.

Localities. Kabete, Kyambu, and Nairobi, in British East Africa.

Ploceus (Hyphantornis) spekei.

♂ 1-2. 16. vi. 12; 15. v. 13.

♀ 1-2. 16. vi. 13; 6. vii. 12.

Imm. 1.

Speke's Weaver is a common species. These birds nest in colonies, as a rule; but I have found them nesting singly.

The males are very noisy during the breeding-season and love to sit on some conspicuous branch and display, at the same time calling loudly. One cannot call the sounds made a musical production, but still it is ever welcome. The nest is a large structure, composed of grass and lined with flowering grass-heads. The eggs are large and of a bright blue colour, some have a few black spots. Dozens of nests are built by the male, but only one is occupied, thus there are always plenty of old nests in all stages of completion.

In the Kano district these birds were nesting along with *P. intermedius*.

Localities. Kano, Kisumu, and Nairobi, in British East Africa.

Ploceus (Sitagra) intermedius.

♂. 19. vi. 12.

The Lesser Black-headed Weaver was found nesting in June along with *P. spekei*, but unfortunately I had not got the time to spare in order to discover this bird's nests from amongst the others—they were all alike from a distance.

Localities. Kano and Kisumu, in British East Africa.

Ploceus (Sitagra) jacksoni.

♂ 1-2. 1. v. 12; 7. v. 12.

♀ 1-4. 1. i. 14; 12. iii. 12; 23. ix. 10.

Jackson's Yellow-backed Weaver is quite a good species and is quite distinct from *P. fischeri*, though they inhabit the same districts.

We found it breeding in May at Buziranjuvo in the papyrus-swamps. The nests resembled those of *P. dimidiatus*, the eggs were blue with purply-brown spots. Unfor-

tunately a sufficiently large series was not collected, but I have no doubt that the eggs of this species vary to the same extent as do those of other Weavers. The eggs taken cannot be distinguished from similarly coloured eggs of *P. dimidiatus*. At Jinja, these birds were breeding in January.

Localities. Kampala, Buziranjuvo, and Jinja, in Uganda.

Ploceus (Sitagra) dimidiatus.

♂ 1-5. 25. ix. 10; 22. x. 10; 13. iii. 12; 13. iii. 12; 13. xiii. 12.

Imm. 2.

♀ 1-6. 13. iii. 12; 17. iv. 11; 19. v. 12; 20. vi. 12.

Nestlings 5.

The males in this series, from the north shore of Lake Victoria, westward to the lakes, are all dark birds. They have the black of the head extending well over the nape behind, and on to the crop below in the form of a triangular patch. The mantle is dark olive-yellow with dark shaft-streaks to the feathers, giving to it a streaky appearance. The colour of the mantle is separated from the black of the nape by a *very narrow* yellow band. The rump is light olive-yellow; the underside is very dark chestnut, not quite as dark as in *P. jacksoni*.

♂ 1-5. 2. vii. 12.

♀ 1-6. 2. vii. 12.

This series, comprising birds in good plumage, collected from one nesting-colony in one day, are all alike. They present the following characters:—The black of the head does not extend much beyond the posterior angle of the eyes, is tinged with rufous at the edges, and does not extend far on to the crop; there is a wide light yellow band separating the black of the head from the golden-olive of the mantle; the rump is bright yellow; the breast and rest of the underparts are cadmium-yellow with only a small amount of rufous or chestnut shading on the crop; in two specimens this shading is almost absent, thus closely

resembling *P. capitalis*. It appears to me that we have two distinct subspecies here, but as we are unable to examine the types of *P. fischeri* and *P. dimidiatus*, no final conclusion can be drawn.

These birds nest in colonies in the papyrus-swamps, making the framework of their nests of the strands of the papyrus flowering-heads, and lining this with broad reed-blades, and finishing them off with finer grass. Two nests are sometimes built on the same stalk. The eggs, usually two in number, vary from white to blue, pink, brown, terracotta, green or dark chocolate, and are uniform, or spotted with ash-brown and red-brown.

They breed in December and January, and in May to July.

Localities. No. 1: Kyanuna, Bukurungu, Kyakasengula, Kariba's Camp, Nile Province, and Chagwe, in Uganda.
No. 2: Kisumu to Kano, in British East Africa.

Ploceus (Sitagra) pelzelni.

♂ 1-6. 2. vii. 12; 31. vii. 06; 20. vii. 06; 5. iv. 12; 2. vii. 12.

♀ 1-3. 21. vii. 06; 22. x. 10; 8. vii. 12.

This small Black-faced Weaver was common in the papyrus-swamps. They arrived in numbers in July at Kisumu swamp and commenced to nest straight away. Sometimes two nests were constructed on the one stem, but only one was occupied. They did not mix with the *P. dimidiatus* which were nesting in the same swamp, but kept to a small colony of their own.

I am inclined to think that the East African birds are rather more strongly built than the Uganda birds, and that the males have less black on the head and females more golden on the crown. This is the case in our small series. Furthermore, all the eggs taken at Kisumu were invariably pure white, while Uganda specimens were dirty or salmon-pink.

Localities. Mawakota, Bukurungu, and Sesse Isles, in Uganda; Kisumu and Kano, in British East Africa.

Ploceus (*Xanthophilus*) *xanthops camburni*.

♂. 29. xii. 12.

A single specimen was obtained in a papyrus-swamp.

Locality. Majanji, in Uganda.

Ploceus (*Xanthophilus*) *bojeri*.

♀. 10. vi. 13.

A single female was shot in an acacia-tree near a swamp where these birds were breeding. These birds have brilliant yellow inner webs to the wing-feathers.

Locality. Embu, in British East Africa.

Ploceus (*Xanthophilus*) *castanops*.

♂ 1-2. 24. ix. 10.

♀. 23. xi. 10.

Not very plentiful. They nest amongst the elephant-grass or low mimosa-shrubs; the eggs are pinkish with red-brown spots.

Localities. Kazinga Channel and western shore, Buddu, in Uganda.

Ploceus (*Ploceus*) *superciliosus*.

♂ 1-4. 20. v. 12; 29. i. 12; 21. ix. 12; 21. ix. 12.

♀. 20. v. 12.

Fairly common. They were breeding in May in the tall elephant-grass. Three eggs are laid. Males breed before they have assumed the full breeding-plumage.

Localities. Kyetema and Mbarara, in Uganda.

Amblyospiza melanotus.

♂ 1-10; ♀ 1-6. Collected in every month of the year.

In this large series there is great variation in plumages, in the males especially. Some have no white frontal band, others have it extending to well beyond the eyes. In some the head is pale, in others it is very dark, almost blackish, as in *A. unicolor*. Two specimens have the mantle and rump black, with only a faint tinge of brown; in three the brown colour of the head extends to the rump, and there are three specimens with a grey abdomen. There are

two specimens which agree in every way with Neumann's type of *A. ethiopica*, and these are males which have not assumed the fully adult plumage, but retain some of the characters of the intermediate stage. I suspect that Neumann's bird is simply an immature bird.

A. melanotus would appear to range from the White Nile, south to Victoria Nyanza, into East Africa as far south as Fort Ternan. Further south its place is taken by *A. unicolor*.

Wings 87-99 mm. in males, 83-93 mm. in females.

These birds inhabit the swamps and the undergrowth of forests during the non-breeding season. They build the most compact and beautiful nest of all Weaver-birds. The entire nest is composed of fine strands of reed, and is woven to two or more upright reed or papyrus stems. The eggs are a beautiful pink or salmon-colour with red-brown spots.

Young birds are very similar to the females in plumage.

Localities. Kyetema, Mabira, Mawakota, Buziranjuvo, and Karajumba, in Uganda; Kisumu and Fort Ternan, in British East Africa.

Amblyospiza unicolor.

♂ & ♀. 28. xii. 14.

Fairly common in the swamps. Nesting in March, June, and December. The nest and eggs of this species are the same as those of the preceding.

Localities. Nairobi and Kyambu, in British East Africa.

Spermospiza ruficapilla.

♂ 1-5. 9. ix. 13; 3. ii. 13; 10. x. 13; 14. x. 13; 8. iii. 14.

Imm. 8. iii. 14.

♀ 1-5. 19. x. 13; 10. iii. 13; 14. x. 13; 3. ii. 12; 3. ii. 12.

Imm. 14. x. 13.

A good series of this species was obtained. Birds in breeding condition were shot in October and February—they are in fine condition. Young in first plumage were shot in March and October.

This species builds a large untidy nest of grass, placed in

some thorny bush. Young birds have the head, throat, and breast brownish and the rest of the plumage a dull black; a few red feathers are present on the rump. Young females have a whitish tinge to the breast.

These birds are found in the forest.

Localities. Mabira, Kivuvu, and Bugoma Forests, in Uganda.

Pyrenestes coccineus.

Pyrenestes ostrinus (Vieill.); Reichenow, Vög. Afr. iii. p. 106.

♂ & ♀. 25. vi. 06.

This is an uncommon species, which is found in the forests.

Locality. Bale, in Uganda.

Pyrenestes ostrinus centralis.

Pyrenestes ostrinus centralis Neumann, J. Ornith. lviii. 1910, p. 529: Sesse Isls., Victoria Nyanza.

♂ 1-3. 17. xi. 13; 7. iii. 13; 26. ii. 14.

♀ 1. 10. x. 13.

A very rare species, confined to the forests. In this small series no two males have the same-sized bills, the largest is equal in size to that of *P. ostrinus ostrinus*, while the smallest is equal in size to bills of *P. coccineus*. The difference in size is not so much in the length of the culmen, but in the depth of the lower mandible. All these specimens are adult birds. Culmen along the cutting-edge 15-18 mm. Wings 67-72 mm.

Localities. Mabira and Bugoma Forests, in Uganda.

Quelea æthiopica.

♂ & ♀. 24. x. 10.

Plentiful at certain times of the year in the native gardens.

Locality. Bwezu Toro, in Uganda.

Quelea erythrops.

♂ & ♀. 5. iv. 12.

Several small flocks were met with from time to time in

the western Provinces. The male had large testes, but is in full moult on the head, where new crimson feathers are sprouting, while the remainder of the plumage is worn. I can find no trace of body-moult or new feathers coming in. Do males simply change the colour of the head when the breeding-season comes on?

Locality. Mawakota, in Uganda.

Quelea intermedia.

Quelea sanguinirostris aethiopica (Sund.); Reichenow, Vög. Afr. iii, p. 109 [part.].

♂ 1-4. 30. x. 10; 28. xi. 10; 20. xi. 10; 7. vi. 09.

♀ 1-3. 26. xi. 10; 7. vi. 09; 28. xi. 10.

Very plentiful in the western Provinces in the grass-lands and about the native shambas. There are no two birds alike amongst the males, with respect to the colour of the head. Some males were breeding before they had attained the full plumage.

Localities. Toro and Lake Edward, in Uganda.

Quelea cardinalis.

♂ 1-4. 14. vii. 12; 25. vi. 12; 4. i. 10; 12. viii. 12.

Imm. 20. xii. 09.

♀ 1-3. 29. xii. 09; 14. vii. 12; 26. i. 12.

Common, frequenting the grass-country and native gardens. They were breeding in May and June in a swamp near Nairobi. The nest, a semi-domed structure, was slung between two reed-stems.

Localities. Kyetema, Sio River, Kabanga, and Jinja, in Uganda; Kisumu and Nairobi, in British East Africa.

Pyromelana ansorgei.

♂ 1-3. 5. ix. 10; 7. vii. 12; 15. vi. 12.

This Whydah was not common, one met with an odd pair here and there in the swampy country. They were apparently breeding in June and September. The males are all in full breeding-dress.

Localities. Mpumu and Sio River, in Uganda.

Pyromelana flammiceps.

♂ 1-2. 22.viii. 12 ; 9.vii. 12.

Large numbers of these birds were breeding in the swamps and reed-beds in the Kavirondo country in June. These two specimens are in breeding-dress, though one has not moulted off all the plumage-feathers of the crown.

Locality. Jinja, in Uganda.

Pyromelana nigrifrons.

♂ 1-11. All collected in October and November.

♀ 1-5. Ditto.

This series of males in breeding-dress shows very well the great variation in the colour of these birds. One specimen has no black on the chin. These birds were breeding in large numbers in the elephant-grass and reeds in western Uganda. The nests do not differ from others of this group. The eggs are bright blue. Two to three form the clutch.

Localities. Kasinga, Lusasa, Kilima, and Kigalama, in Uganda.

Euplectes xanthomelas.

♂ 1-7. 6.xi. 10 ; 22.x. 10 ; 28.x. 10 ; 4.vii. 09 ; 6.iv. 10 ; 4.i. 10.

♀ 1-2. 5.vi. 14 ; 10.v. 14.

Two of these males in full plumage have white chins. A common species, nesting in the grass in the open scrub and swamp country. They breed in May and June, and again in October and November.

The nest is constructed amongst the grass or small shrubs and does not differ from those of others of this group, which are loosely woven with grass-blades and lined with finer grass. They are semi-domed—that is, they are circular with an opening at one side, towards the top. The eggs, two to three in number, are olive-brown in ground-colour, with ash-brown spots ; the surface is glossy.

Localities. Kisala, Lake Edward, Ankole, and Toro, in Uganda ; Nairobi, in British East Africa.

Urobrachya phœnicea.

♂ 1-6. 9.vii.09; 18.v.14; 20.vi.12; 9.viii.09;
6.iii.12; 26.ii.14.

Juv. 29.iii.12; 14.x.10.

♀ 1-3. 24.iv.12; 26.ix.10; 15.v.13.

Common. These birds breed in the tall rank grass of swamps. The nest is woven with coarse grass and lined with finer grasses, and resembles that of the preceding species in shape. The eggs are greenish, with brown and ash-coloured spots. These birds have a heavy flight. The extent of brown on the shoulder varies in individuals.

Localities. Kibanga, Kabombo, Kagera, etc., in Uganda; Kano, in British East Africa.

Coliuspasser concolor.

♂ 1-6. 29.iv.10; 3.ix.10; 3.ix.10; 1.v.10; 24.iv.10;
26.iv.10.

These birds are in full breeding-dress. The very old birds have no pale edgings to the wing- and rump-feathers. One old male has a rusty patch on the throat, and is probably a hybrid.

Localities. Kabamba, Mpumu, Lufumvwe, Kyetema, and Kibanga, in Uganda.

Coliuspasser ardens tropica.

Red-banded: ♂ 1-7. 26.v.10; 20.ix.10; 26.viii.10;
20.ii.09; 24.ii.12; 12.xii.10; 26.ii.11.

♀. 4.x.10.

Yellow-banded: ♂ 1-4. 25.v.10; 26.ii.11; 7.vi.10;
26.ii.11.

These birds frequent the grass and swamp country, and are fairly common. They nest in the tall rank grass, constructing a loosely-woven semi-domed nest of grass. The eggs, from two to three in number, are of a greenish ground with ash-brown spots and blotches.

Localities: Var. 1. Kyetema, Kyakasengula, Kalwanga, Buziranjuvo, Kyatwe, Kikarongo, Mukombo, in Uganda.

Var. 2. Nakatogo, Kalwanga, Kyatwe, in Uganda.

Coliuspasser laticauda.

♂ 1-2. 17.v. 14; 10.vi. 14.

♀. 2.vi. 14.

Common in the grass-country of British East Africa. Nests were found in grassy patches in the scrub and by the swamps. The nest is constructed of grass. The grass-blades in the actual nesting-site are first woven into a ring and the body of the nest built out from this. The nest is very frail, and usually remains unlined until the first egg has been deposited. The eggs are bluish or greenish, with numerous spots and blotches of ash-brown and darker brown. Two is the usual clutch, but as many as four have been found.

Localities. Nairobi, Kyambu, and Kabete, in British East Africa.

Coliuspasser soror.

♂ 1-7. 31.iii. 11; 31.iii. 11; 26.ix. 10; 17.xii. 12; 20.iii. 12; 22.iii. 12; 31.iii. 11.

♂, off-plumage, 3. 18.xii. 12.

♀ 3. 18.xii. 12.

Old adult males are uniform black with a bright yellow shoulder-patch. One male in this series has a distinct golden tinge in the interscapular region, perhaps a hybrid between *C. soror* and *C. macrurus*.

Localities. Businga, Kyakasengula, Bulangi, Hoima, Bulemezi, Miwuju Camp, and Toro, in Uganda.

Coliuspasser eques.

♂ 1-6. 23.iii. 12; 18.iv. 12; 23.iii. 12; 26.v. 10; 20.vi. 11; 20.ix. 10.

♀ 1-3. 30.ix. 10.

A common species, found in Uganda and British East Africa, frequenting the swamps and grass-lands. Young in first dress were shot in February, March, August, and September, and a male in off-plumage in November.

Localities. Kalwanga, Kaina, Bulemezi, in Uganda; Nairobi and Chania, in British East Africa.

Coliuspasser hartlaubi humeralis.

♂, breeding, 1-2. 1. v. 12.

♂, off-plumage, 1. 24. ii. 12.

A rare species. They were breeding in May, in the tall grass by the swamps. Few specimens were seen. Wings 100-103 mm.

Localities. Jinja and Kyetema, in Uganda.

Drepanoplectes jacksoni.

♂ & ♀. 28. xii. 14.

Very common round Nairobi and Kyambu in the swamp and grass-lands. They were also seen at Elmenteita and Nakuru.

Localities. Nairobi, Kyambu, Nakuru, and Elmenteita, in British East Africa.

Spermestes cucullata.

♂ 1-4; ♀ 1-3. 10. vi. 13; 10. vi. 13; 10. vi. 13; 14. viii. 13; 7. iii. 09; 19. i. 12; 1. iv. 12; 1. iv. 12.

Very common, frequenting plantations and gardens. They feed on grass-seeds, which they collect from off the stalks. They build nests in low trees, preferably thorny ones, such as the Orange. The nest is built of grass and lined with flowering grass-heads; the nest proper is round, with a tubular entrance towards the bottom of one side. The eggs, four to seven in number, are pure white. We have taken the nest of this species in every month of the year.

Localities. Kyetema, Kyanja, Nagunga, in Uganda; Nairobi, in British East Africa.

Spermestes scutata.

♂ 1-3; ♀ 1-2. 19. v. 13.

These are adult specimens. They have no green on the flanks or sides.

Localities. Nairobi, in British East Africa; Kyetema, in Uganda.

Spermestes stigmatophora.

♂ 1-2. 24. ii. 14; 4. i. 12.

Found on the outskirts and in forest-clearings. They are not very common, and occur in small flocks.

Localities. Mabira and Namwave Forests, in Uganda.

Spermestes nigriceps.

♂ 1-2. 17.vii.14; 14.v.13.

♀ 1-2. 17.vii.14; 14.vi.14.

♂ juv. 14.vi.14.

Not so common as *S. cucullata*, but fairly plentiful, and found in the same localities and frequently associating in one flock. We occasionally met with them in the thick forest. The nest resembles that of *S. cucullata* and is built in similar situations. The eggs, four to six in number, are white. They are slightly larger and longer than those of *S. cucullata*.

Locality. Nairobi, in British East Africa.

Hypargos monteiri.

♂ 1-4. 7.v.12; 28.ii.12; 1.v.12; 1.v.12.

♀ 1-2. 24.ii.12; 27.xii.11.

Birds shot in December and February have large breeding-organs. These birds were found in the grass-lands and on the outskirts of forests, feeding in the company of *Nigrita sparsimuttata*.

Localities. Kyetema, Buziranjuvo, and Sanga, in Uganda.

Hypargos schlegeli.

♂ & ♀ juv. 17.xii.13; 14.i.14.

An adult male and a young female were shot in the forest. They are not at all common.

Locality. Mabira Forest, in Uganda.

Pytelia belli.

Pytelia belli O.-Grant, Bull. B. O. C. xxi. 1907, p. 14: Ruwenzori.

♂. 25.i.10.

A male in full plumage, agreeing well with the type, was shot in the acacia-country. Not very common.

Locality. Sebwe Plains, Uganda.

Nigrita fusconota.

♂ 1-4. 4. i. 14; 14. iii. 12; 5. xi. 14; 17. xii. 13.

♀ 1-2. 29. v. 12; 5. xii. 14.

Found in pairs or small flocks in the more open forests. They are fairly common.

Localities. Mabira, Kyetema, Naganga, Sezibwa River, in Uganda.

Nigrita schistacea.

♂ 1-8. 10. i. 12; 10. v. 14; 31. v. 12; 20. vi. 14; 7. v. 12; 17. xii. 13; 28. ix. 10; 10. i. 10.

♀ 1-5. 7. v. 12; 27. iv. 12; 10. i. 10; 9. v. 14; 5. xi. 14.

Nestlings. 5. xi. 14; 3. v. 09.

Imm. 5. x. 14.

This is a common species which shows very little variation, the only character which does vary is the spotting on the wing. Breeding birds are, on the whole, slightly more rich in colouring. The eggs of this species are pure white. Nestlings are dark grey with brownish-black wings and tails. One specimen shows indications of white spots on the coverts, the other does not. The bill is horny brown with a yellow gape. The immature bird, which is quite the size of an adult, is like the nestling in coloration, except that the rump is light grey and the breast mottled with new glossy black feathers. These birds are found in the forests and plantations.

Localities. Mubango, Kyetema, Sezibwa, Buziranjuvo, Kivuvu, Mabira, and Mubendi, in Uganda.

Estrilda astrild massaica.

Estrilda astrild massaica Neumann, J. Ornith. lv. 1907, p. 596; Njoro, British East Africa.

♂ 1-2. 1. iv. 12; 1. iii. 09.

Nestlings. 2. iii. 13.

Very common. Nests were taken in March and July, and from November to January. Two nests, side by side or one on top of the other, are usually found; one only is used by the nesting-bird, the other is simply a blind. These

birds lay a large number of eggs for their size, but many are taken by rats and mice and many are not fertile.

Localities. Jinja, Kyetema, and Naganga, in Uganda; Nairobi, in British East Africa.

Estrilda paludicolor.

♂ 1. 17.v. 12.

♀ 1-2. 15.vi. 13.

Common. They nest in grass and in small shrubs. The eggs are pure white, five to six in number. The nest is similar to that of the preceding species.

Localities. Kyetema and Naganga, in Uganda.

Estrilda subflava.

♂ 1-3. 1.i. 11; 2.xi. 10; 9.vii. 10.

♀ 1-2. 1.i. 11; 2.xi. 10.

The males from Uganda are very much darker and richer in colour than birds from West Africa. We found them nesting in January, March, and July, also in October and December.

On two occasions these birds have adapted the nest of a totally different species to their needs and have reared their young. One pair took over an old nest of *Prinia mystacea*, and, by lining it with flowering grass-heads and fitting a tubular entrance with the same material, made it look quite respectable. The eggs laid by this species are pure white. Four to six are deposited. These birds frequent the open grass-lands and old native gardens.

Localities. Sebwe River, Kyetema, and Toro District, in Uganda; Nairobi and Ngong in British East Africa.

Estrilda nonnula.

♂ 1-3, and nestlings. 21.vii. 09; 4.xi. 10; 24.vi. 09.

Fairly common. Found in the native gardens and in the open forests, and also on the open grass-plains. Nests have been found in nearly every month of the year. Nestlings are like adults in colour, but the red on the rump is not so

bright, while the mantle is washed with brownish and the under surface with greyish buff. The carmine of the flanks is wanting.

Localities. Kyetema, Mpumu, and Mabira, in Uganda.

Lagonosticta ruberrima.

♂ 1-3. 16.vi.10 ; 23.ix.09 ; 29.iv.12.

♀ 1-2. 18.vi.12 ; 7.vii.14.

Nestling. 7.vii.14.

Common everywhere. Nests have been taken in every month. These birds usually build in the thatching of out-houses, on the ground under tufts of grass, in low bushes, and so on, but we have taken a nest which was built on a shelf in a living-room, the nest being built between two tumblers ! The birds are extremely tame, and will hardly get out of one's way should one be coming along a footpath on which they are feeding. The nests are built of grass, bits of paper, and any odd rubbish, and lined with feathers. The eggs are white, sometimes with a few black spots.

Localities. Kyetema and Jinja, in Uganda ; Nairobi, Kisumu, and Kano, in British East Africa.

Lagonosticta congica.

♂. 30.i.12.

Not common in Uganda. They go in pairs, and are to be met with in the grass-country and in the scrub by native villages ; they are also seen on the outskirts of forests.

Locality. Kyetema, in Uganda.

Lagonosticta rhodopareia.

♂ & ♀. 9.vi.13.

♀. 14.ii.14.

Not common, but widely distributed in British East Africa. A nest of this species was found in June, built in a clump of grass ; in shape and in materials used it resembled the nest of other Grassfinches. There were four eggs, entirely white.

Localities. Nairobi and Embu, in British East Africa.

Ortygospiza polyzona.

♂ 1; ♀ 1-2. 18. xii. 12.

These appear to be typical *O. polyzona*. They have white chins and white circles round the eyes.

Locality. Nakuru, in British East Africa.

Ortygospiza gabonensis.

Ortygospiza gabonensis Lynes, Bull. B. O. C. xxxiii. 1914: Gaboon.

♀. 2. x. 10.

A female in breeding-condition. This bird has been compared by Dr. Hartert with birds in the British Museum and in Tring. It agrees perfectly with females of *O. gabonensis*. A specimen in the Tring Museum from the White Nile appears to be *O. atricollis*!

Locality. Butiti, in Uganda.

Neisna nyansæ.

Neisna dufresnayi nyansæ Neumann, J. Ornith. liii. 1905, p. 350: Bukoba, Victoria Nyanza.

♂. 17. i. 14.

I cannot see any difference between this species and *N. kilimensis* Sharpe. This species inhabits the grass-lands on the outskirts of forests.

Locality. Toro, in Uganda.

Neisna kilimensis.

♂ 1-2. 17. xi. 12.

♀. 14. vi. 14.

Juv. 14. vi. 13.

The two adult specimens are breeding birds and in good condition. They are just as bright ochraceous on the underside as Uganda birds, and the throat is just as light. The young bird has the bill black, the lower surface dull ochraceous, with the flanks washed with olive-grey; the crown is dark olive-grey; the mantle is olive, but not barred, and the rump and tail-coverts orange.

Localities. Londiani and Nairobi, in British East Africa.

Uræginthus bengalus ugandæ.

Uræginthus bengalus ugandæ Zedlitz, J. Ornith. lix. 1911, p. 606: Entebbe, Uganda.

♂ 1-3. 5. iv. 11; 5. iv. 11; 25. ii. 09.

♀ 1-4. 17. ii. 09; 16. ii. 09; 1. iv. 12; 1. iv. 12.

The females have the blue of the lores extending over the eyes, side of head, and ear-coverts; the chin and throat are also blue. The males can hardly be distinguished from the British East African subspecies.

Localities. Kyetema, Jinja, and Kiriba's Camp, in Uganda.

Uræginthus bengalus brunneigularis.

Uræginthus bengalus brunneigularis Mearns, Smithson. Misc. Coll. Washington, lvi. no. 20, 1911, p. 6: British East Africa.

♂ 1-4. 6. vii. 13; 14. ii. 14; 7. vi. 14; 7. vi. 14.

♀ 1-3. 14. ii. 14; 6. vii. 13; 7. vi. 14.

These females differ from the preceding in having the throat, the ear-coverts, sides of head, and lores brown like the mantle. The blue of the under surface is confined to the crop, breast, and flanks.

One male has practically the whole of the underside bright rich blue, there being merely the faintest indication of buff on the middle of the abdomen, and the under tail-coverts are blue.

Localities. Kisumu and Nairobi, in British East Africa.

Uræginthus roosevelti.

Granatina ianthinogastra roosevelti Mearns, Smithson. Misc. Coll. Washington, lxi. no. 9, 1913, p. 3: Sotik distr., B. E. Africa.

♂ 1-3. 6. vii. 12; 6. vii. 12; 7. vii. 12.

♀ 1-2. 6. vii. 12.

Mearns has described this species at some length in his paper on the Roosevelt collection. The female differs from female *U. ianthinogastra* Reichw. in having the superciliary stripe and cheeks blue, not lilac. This difference is constant.

Localities. Kisumu and Kano, in Kavirondo, British East Africa.

Hypochera orientalis.

Hypochera amauropteryx Sharpe; Reichenow, Vög. Afr. iii. p. 215 [part.].

♂ 1-2. 6.ix.09; 12.i.14.

♀. 6.ix.09.

The male collected in September is in full breeding-dress. That shot in January is in the mottled stage of moult into the breeding-plumage. Birds in this condition were singing lustily and pairing off with their females in January.

Localities. Jinja and Buvuma Isls., Uganda.

Hypochera chalybeata.

♀ 1; ♀ 1. 7.vi.12.

This male in full breeding-dress has a strong greenish sheen. They were breeding in May and June. The nest was placed in a thick spray of the Cape lilac, about seven feet from the ground. The eggs, three in number, are white. These birds are found in the scrub and open country, by native villages, and in the open spaces of markets.

Locality. Kisumu, British East Africa.

Vidua hypocherina.

♂. 21.vi.12.

This species is not common. They were seen in the dry acacia-country and in the scrub in Kavirondo. They associated with *H. chalybeata*. I could not see any difference between the females of the two species. These birds were in breeding-condition in June.

Localities. Kisumu and Kano, in British East Africa.

Vidua serena.

♂ 1-6. 12.x.10; 4.x.09; 18.vii.06; 4.x.09; 13.iii.09; 12.x.10.

♂ 1-4, change plumage. 31.vii.09; 15.vi.10; 22.vii.09.

♀. 22.iii.12; 18.vii.06.

Juv. in change and intermediate plumage. 10.i.12.

This series is a good one, as showing the various stages of plumage-change through which this bird goes, from the nestling to the adult male in full breeding-dress. The first

sign of coming maturity is the change of colour in the bill from black to coral-red.

Much still remains to be found out regarding this bird's nesting-habits. I do not think that they are strictly polygamous.

Localities. Katwe, Hima River, Kyetema, Sesse Islands, Kulwe Isle, and Buziranjuvo, in Uganda.

Passer griseus ugandæ.

Passer griseus (Vieill.); Reichenow, Vög. Afr. iii. p. 230 [part.].

♂ 1-2. 14. vi. 10; 22. ix. 10.

♀ 1-2. 10. i. 13; 22. ix. 10.

A common bird. Plentiful in the towns and villages, and open forests. In habits they are like the European Sparrow. They build in holes in trees, in thatch of houses, and in disused nests of other birds, such as Swallows'. The eggs are like those of the *P. domesticus*, and vary in colour to the same extent.

Localities. Kyetema and Jinja, in Uganda.

Passer griseus suahelicus.

♂ 2. 14. vii. 14.

This is the British East African representative; in habits it does not differ at all from the Uganda birds, neither are its eggs different.

Localities. Nairobi and Chania, British East Africa.

Passer rufocinctus.

♂ 1-2. 26. v. 12; 2. iv. 12.

♀. 27. xi. 12.

Common in certain localities, but by no means so plentiful as *P. g. ugandæ* or *P. g. suahelicus*. We have found them breeding in June and October, in holes under the eaves of an outhouse, in holes in trees, and in deserted Weavers' nests.

Localities. Naivasha, Nairobi, and Nakuru, in British East Africa.

Poliospiza reichenowi.

♂ 1-2. 27. xi. 12 ; 10. vi. 13.

♀. 10. vi. 13.

Common at certain times of the year in certain places. They are partial local migrants. We found them breeding from May to July, and from December to January. The nest is serine in character. The eggs, two to three, are small and of a bluish-white ground spotted with brownish-black. The nest is usually placed in some low bush, but we have taken it as high up as forty feet.

Localities. Embu, Kikuyu, and Nairobi, in British East Africa.

Poliospiza somereni.

Serinus angolensis somereni Hartert, Bull. B. O. C. xxix. 1912, p. 63 : Uganda.

♂ 1-3. 25. xi. 10 (*type of the species*); 25. xi. 10 ; 20. ii. 11.

♀. 13. ii. 09.

Not common. This species was described by Dr. Hartert from a pair of birds. Other birds have since been secured. It is a dark species.

Localities. Sebwe Plains and Kyetema, in Uganda.

Poliospiza striolata affinis.

Crithagra striolata affinis Richmond, Auk, 1897, p. 156 : Kilimanjaro, G. E. Africa.

♂ & ♀, and nestlings. 10. xii. 13 ; 14. xii. 13 ; 5. vii. 13.

A common species found in the well-timbered gardens and in the scrub-country. They were found nesting from March to July and again from November to January. The nest is composed of rootlets and twigs, into which is woven a quantity of grass and moss, the inside is lined with vegetable-down, fibres, and hairs. The eggs are creamy-white or bluish-white with dark brown speckling. The site chosen for the nest is generally some low bush or creeper. Nestlings resemble the adults in general colour, but are duller.

Localities. Nairobi and Nakuru, in British East Africa.

Serinus shelleyi.

Serinus sharpei Neum. ; Reichenow, Vög. Afr. iii. p. 266 [part.].

♂ 1-2. 8. xi. 12 ; 4. xi. 10.

♀ . 5. ii. 09.

Not very common. They are to be found in gardens and in the more open parts of small woods, and in the scrub. They nest in small trees and bushes, or in the comb of a banana-bunch. The nest is composed of rootlets and grass, and lined with fibre and hair. The eggs are pale blue spotted sparingly with dark brown and liver. Nests have been taken from April to July and in October and December.

Localities. Jinja and Kyetema, in Uganda ; Kisumu, in British East Africa.

Serinus dorsostriatus.

♂ 1-3. 13. vii. 12 ; 10. vi. 12 ; 10. vi. 12.

♀ . 10. vi. 12.

Fairly common, especially on the north shore of Lake Victoria. These birds were found nesting in acacia-trees, in Cape lilac, and rubber-trees, in June and July, and also in November and January. The nest is small and is composed of fibres and rootlets lined with fibres and hair and cotton-down, or with cotton-down on the outside. The eggs are a pale blue, spotted and streaked with dark brown or black, or they may be uniform blue. The birds from Kisumu are very much brighter golden green than any birds from the type-locality in the Tring Museum.

Localities. Jinja, in Uganda ; Kisumu, in British East Africa.

Serinus icterus barbatus.

♂ 1-4. 15. vi. 10 ; 6. v. 12 ; 23. iii. 12 ; 3. x. 10.

♂ juv. 24. i. 12 ; 1. iii. 12.

♀ . 6. v. 12.

These birds nest in low bushes and trees, and in banana-bunches. The nest is composed of rootlets lined with cotton or hairs. The eggs are whitish or greeny bluish with brown

markings. The nest is found from April to July and from December to January; it contains two to three eggs. Young birds still being fed by their parents were shot in May and January. These differ from the adults in being duller; the ear-coverts are green; the frontal and superciliary stripes are narrow, and there is no black line on either side of the throat; the rump is green, not yellow.

Localities. Jinja, Kyetema, Kabamba, and Butiti, in Uganda; Kisumu, in British East Africa.

Spinus citrinelloides frontalis.

♂ & ♀. 3. x. 10; 4. v. 12.

Not common. They build their nests in banana-combs and in low bushes. The nest is composed of grass and cotton-down, and lined with fine grass-fibres. The eggs are dirty white or creamy, spotted towards the larger end with dark brown and purple markings. Two are usually laid. Nests have been taken in May and June. All these Serines are good singers.

Localities. Butiti and Kyetema, in Uganda.

Spinus citrinelloides kikuyuensis.

Spinus citrinelloides kikuyuensis Neumann, J. Ornith. liii. 1905, p. 356: Kikuyu, British East Africa.

♂. 10. vi. 13.

♀. 10. vi. 13; 11. vi. 13; 15. vii. 12.

The Black-faced Serine was fairly common. We took their nests from May to July and in December. The nest is small and is usually placed in the fork of a small upright shrub. It is made of grass and a few rootlets, and lined with fibres and hair and vegetable-down. The eggs are a dirty creamy-white or greyish white, with a few brown and purple spots and marks. Two or three eggs are laid.

Localities. Kisumu, Embu, Kikuyu, and Nairobi, British East Africa.

Emberiza flaviventris.

♂ 1-2. 27. ix. 10; 21. viii. 10.

Found in the open scrub-country in pairs, not very common.

Localities. Kyabalenga and Kyetema, in Uganda.

Fringillaria tahapisi.

♂ 1-2. 6. xi. 10.

♀ . 20. vi. 12.

Not very plentiful, was seen in the dry rocky country and in the scrub-lands.

Localities. Katwe and Toro, in Uganda ; Kisumu, in British East Africa.

Motacilla vidua.

♂ 1-5. 17. vii. 10 ; 21. v. 10 ; 15. v. 10 ; 5. xii. 14 ; 25. vii. 09.

♀ . 21. v. 10.

Imm. 21. v. 10.

A common species, but a sweet songster and very tame. They were breeding from April to July, and are common foster-parents of the two common Cuckoos, *Chrysococcyx cupreus* and *Cuculus solitarius*. One specimen is an almost full albino, while another has the white of the forehead extending well behind the eyes.

Localities. Kyetema, Kalwanga, and Kasaka, in Uganda ; Nairobi, in British East Africa.

Motacilla alba.

♂ 1-2. 15. xii. 12.

Not very common, occasionally met with as a migrant.

Locality. Busiya, in Uganda.

Budytes flavus.

♂ 1-7. 3. x. 10 ; 16. xi. 09 ; 11. xi. 09 ; 5. ii. 11 ; 4. xi. 10.

♀ . 4. xi. 10.

A very common migrant, found about most of the lakes, on the grass-lands, and banks of rivers.

Localities. Toro and Ankole Districts, Busoga and Chagwe, in Uganda.

Budytes melanocephalus.

♂ 1-4. 5. iv. 11 ; 4. xi. 10 ; 5. iv. 11 ; 2. xi. 12.

♀ 1-2. 5. iv. 11 ; 2. xi. 10.

Fairly common at certain seasons.

Localities. Butiabwa, Lusassa, and Jinja, in Uganda.

Budytes campestris.

♂ 1-4. 5.xii.11 ; 30.ix.10 ; 23.xii.12 ; 15.i.13.

♀ 1-3. 11.ix.13 ; 17.ix.13 ; 7.ix.13.

Common on migration, frequenting the open grass-plains and rocky land, the shores of lakes and swamps. They were particularly plentiful during the winter of 1913.

Localities. Jinja and Kyetema, in Uganda ; Nakuru and Nairobi, in British East Africa.

Anthus trivialis.

♂ 1-4. 2.ii.14 ; 24.i.12 ; 3.i.11 ; 3.xi.13.

♀ 1. 18.xii.14.

Extremely common on migration, and very tame.

Localities. Kyetema and Jinja, in Uganda ; Nairobi and Nakuru, in British East Africa.

Anthus rufulus cinnamomeus.

♂ 1-3. 26.ii.12 ; 22.vi.13 ; 28.xi.10.

Not very common, but general in distribution. They were found nesting in May. The eggs are greyish white with ash-grey-brown mottlings. The nest is of the usual type, placed under a tuft of grass or under an overhanging rock.

Localities. Katwe and Buziranjuvo, in Uganda ; Kano, in British East Africa.

Anthus sordidus.

♂ 1-2. 10.i.12 ; 20.vi.12.

♀ 1-2. 1.v.12 ; 31.vii.09.

A common species, inhabiting the open country. It nests in May and June, selecting a well-hidden spot in which to build, such as under a tuft of grass or small shrub. The nest is composed of grass and is lined with fibres. The eggs are buff in ground-colour, with ash-grey and brown spots.

Localities. Kyetema and Buziranjuvo, in Uganda ; Kano, in British East Africa.

Macronyx croceus.

♂ 1-6. 22.vi.12 ; 24.ii.12 ; 1.v.12 ; 7.vii.10 ; 9.xi.09 ; 26.vi.06.

♀ 1-3. 20. vi. 06; 16. ii. 12; 15. v. 12.

Imm. 14. i. 13; 6. vii. 10.

Found in the scrub, acacia, and open grass country. It is a common species. Its note is monotonous and frequently uttered when the bird is at rest on the top of some low bush. Its eggs have been taken from March to June, and we have shot very young birds in December. The nest is usually placed under a tuft of grass; the nesting-material used is very scanty and is mainly composed of fine grass-fibres.

The eggs are a dirty buff, speckled with brown. Very young birds are sandy above and below with black-brown markings on the back and wings, and a faint wash of yellow on the flanks.

Localities. Kasaka, Buziranjuvo, Mohokya, and Kyetema, in Uganda; Nairobi, Kano, Londiani, and Ravine, in British East Africa.

***Macronyx sharpei* and *M. newtoni*.**

These were seen in the Nakuru and Kenia districts, but no specimens were obtained.

***Mirafrā fischeri*.**

♂ & ♀. 6. vii. 12.

Fairly plentiful in the scrub and grass country. They were nesting in June, the nest being constructed in a shallow depression under a tuft of grass. Very little nesting-material is used.

The eggs, three to four in number, are a dirty-buff ground-colour, speckled with dark brown, the surface semi-glossy. When excited these birds fly into the air and make a flapping sound with their wings as they hover.

Localities. Kisumu and Athi Plains, British East Africa.

***Mirafrā rufocinnamomea*.**

♂ & ♀. 6. x. 09.

Not a common species. They were found breeding in October and June. They have the same habits as *M. fischeri*.

They flap their wings in the same way, but the sound produced is louder; thus they have received the local name of "Castanet Lark."

Locality. Butiti, in Uganda.

Mirafrā africana tropicalis.

♂ 1-4. 28.xi.10; 26.vi.06; 26.vi.06; 17.vi.06.

♀. 26.vi.06.

Fairly common in the open grass-country. They were nesting in June. The eggs, two to three in number, are brownish white with dark brown and blackish markings, mostly concentrated about the larger diameter.

Localities. Semliki Valley and Bale, in Uganda.

Mirafrā sp., near *albicauda*.

♀. 24.xii.13.

This specimen is badly hit. I am unable to name it with certainty for want of material for comparison. It was shot in the grass-country.

Locality. Nakuru, in British East Africa.

Calandrella cinerea saturator.

♂ & ♀. 3.xi.10; 7.vi.10.

Not a common species, frequenting the open plains. Eggs of this species were obtained at Mawakota in June.

Localities. Lusasa and Mawakota, in Uganda.

Criniger verreauxi ndussumensis.

♂ 1-7. 14.ii.13; 1.x.12; 19.x.13; 10.x.13; 17.xi.13; 14.x.14; 14.xii.14.

♀ 1-7. 24.ii.14; 19.x.13; 3.xi.13; 9.v.14; 9.v.14; 10.xi.13; 2.ii.14.

This large species of forest Bulbul was met with in the large forests. They frequented the tall trees, as well as the taller undergrowth.

Localities. Mabira, Bugoma, Mubango Forests, in Uganda.

Bleda woosnami.

Bleda woosnami O.-Grant, Bull. B. O. C. xix. 1907, p. 87: Mpanga Forest, Uganda.

♂ 1-8. 20.vi.14; 14.vi.12; 12.ix.12; 10.xi.13; 3.xi.13; 7.i.13; 17.i.14; 8.xi.14.

♀ 1-4. 14.xii.13; 12.ix.13; 3.xi.13; 8.xi.14.

This large series of Woosnam's Bulbul shows great variation in the size of the bill and colour of the underside, and some specimens are hardly distinguishable from *B. syndactyla*. Young birds collected in September show rusty mottlings on the mantle; the upper secondaries are strongly washed and tipped with rusty; the secondary coverts are rusty with pale terminal spots; the rump washed with rusty red, and the under surface not so bright as in adult males. The feet are yellowish horn, as is also the bill, except at the base, where it is greyish. In two specimens the breast has several rusty-coloured feathers.

Localities. Mabira, Mubango, Kyetema, and Kasala Forests, in Uganda.

Bleda eximia ugandæ.

Bleda eximia ugandæ van Someren, Bull. B. O. C. xxxv. 1915, p. 116: Mabira Forest, Uganda.

♂ 1-4. 26.ii.14; 17.i.14 (*type of the species*); 10.xi.13; 27.ii.14.

♀ 1-4. 13.iii.14; 27.ix.13.

Similar in general colour to *B. eximia*, but lacking the yellow postorbital spot and having the preorbital spot dull olive, not bright yellow; the tail-feathers broadly tipped (for the terminal inch) with bright yellow, excepting the middle pair, which may or may not be tipped with yellow. Under surface bright yellow, the flanks more olive; under wing-coverts, inner webs of primaries, and secondaries bright yellow. Bill shorter; feet grey, not yellowish. Wing 105-115.5 mm. This is a forest-species, similar in habits to *B. woosnami*.

Locality. Mabira Forest, Uganda.

Bleda pallidigula.

♂ 1. 15.xi.14.

♀ 1-2. 24.ii.12; 28.v.10.

This is a forest-species which was met with on a few

occasions. It is not common. In May we procured a nest of this species with three eggs of its own and one of *Cuculus solitarius*.

Localities. Sezibwa River, Kasala, and Buziranjuvo, in Uganda.

Chlorocichla indicator chlorosaturata.

Chlorocichla indicator chlorosaturata van Someren, Bull. B. O. C. xxxv. 1915, p. 127 : Kyetema Forest, Uganda.

♂ 1-10 ; ♀ 1-7 (♂ and ♀ 7. xii. 14, *types of the species*). Collected in every month of the year.

This series is constant the whole way through as to the distinguishing characters between this subspecies and *C. indicator*, of the West Coast. These birds inhabit the large forests, frequenting the tops of the tall trees. They feed on insects and wild figs.

Localities. Mabira and Kasala Forests, in Uganda.

Phyllastrephus albigularis.

♂ 1-8 ; ♀ 1-10. Collected throughout the year.

The birds of this series are quite distinct from *P. leucolæma* Sharpe. They are very alike in colouring, but differ in size. Wing, ♂ 68-75, ♀ 67-73 mm.

This is a forest-species.

Localities. Mubango, Mabira, and Kasala Forests, in Uganda.

Phyllastrephus leucolæma.

Phyllastrephus albigularis (Sharpe); Reichenow, Vög. Afr. iii. p. 400 [part.].

♂ 1-8 ; ♀ 1-6. Collected throughout the year 1913-14.

This species is larger than the preceding. It is a forest-bird. Wing, ♂ 83-88, ♀ 73-84 mm.

Localities. Mabira, Kyetema, Kasala, and Sezibwa River Forests, in Uganda.

Phyllastrephus succosus hypochloris.

Stelgidillas hypochloris Jackson, Bull. B. O. C. xix. 1906, p. 20 : Toro, Uganda.

♂ 1-4. 17. x. 14 ; 14. iii. 14 ; 5. ii. 14 ; 24. iv. 14.

♀ 1-3. 17. x. 13 ; 15. x. 13 ; 24. iv. 14.

These birds are near *P. succosus* Reichw., not *Andropodus gracilirostris*, as stated by Jackson in his original description from a single specimen, which until now has remained unique. These birds are darker than *P. succosus*, being of an almost uniform yellowish olive-grey. Wings, ♂ 77-83, ♀ 68-70 mm.

Localities. Mabira, Kasala, and Mubango Forests, in Uganda.

Andropadus virens.

♂ 1-23; ♀ 1-24. Collected throughout the year 1913-14.

This large series contains several very young birds, and a partial albino. This latter has a pale yellow tail, with yellow abdomen and secondaries of the same colour; the rump-feathers are yellow for half their length.

Nests and eggs of this species have been collected in May and October.

Localities. Generally distributed over all the wooded districts in British East Africa and Uganda.

Andropadus eugeneus.

♂ 1-13; ♀ 1-14. Collected all the year round.

This series includes birds in all stages of plumage. The nest is usually situated on some low tree of the forest undergrowth. A foundation of dead leaves is first laid down, then the nest proper is built of rootlets and twigs and lined inside with fine fibres. The eggs are dirty pink, with liver-coloured spots and greyish under-markings; the surface is smooth and glossy.

Localities. In all the forests—Mabira, Kasala, etc.—in Uganda.

Andropadus ugandæ.

Andropadus ugandæ van Someren, Bull. B. O. C. xxxv. 1915, p. 127: Mabira Forest, Uganda.

♂ 1-10; ♀ 1-8 (♂ 20.iv.14, ♀ 7.11.14, *types of the species*). Collected throughout the year 1913-14.

This species is midway between *A. gracilis* and *A. minor* in point of size, but is easily distinguished from the latter by being slightly larger and in having the throat and breast

greyish; the upper surface more greenish olive, and the tail more rusty; eyelids white. Wing, ♂ 68–71, ♀ 65–68 mm.

Localities. Mabira, Kyetema, Kasala, and Mubango Forests, in Uganda.

Andropadus gracilirostris chagwensis.

Chlorocichla gracilirostris chagwensis van Someren, Bull. B. O. C. xxxv. 1915, p. 127: Chagwe, Uganda.

♂ 1–14; ♀ 1–8 (♂ ad. 20. x. 14, *type of the species*). Collected throughout the year 1913–14.

We have separated the Uganda race of *A. gracilirostris*, because there are certain constant characters which distinguish these birds from *A. gracilirostris gracilirostris* from Fernando Po and *A. g. percivali* from British East Africa. *A. g. percivali* is very near *A. g. chagwensis*, and the two races meet in the Elgon district. In naming these birds, I went over the whole of the series in the Tring and British Museums. They can be divided up according to localities into two main groups, eastern and western, the first group including birds from Uganda, Tanganyika, and British East Africa; the second those from Angola, Gaboon, Nigeria, Fernando Po, and Sierra Leone. The first group can be subdivided into two, viz. *A. g. percivali* Neum. from British East Africa, and *A. g. chagwensis* van Someren from Uganda, east to Elgon, south to Tanganyika, west to Congo border.

The characters of *A. g. percivali*, compared with *A. g. gracilirostris*, are: Upper surface much brighter olive-green, under surface clearer grey, and the throat to neck creamy (not well demarcated).

A. g. chagwensis: Upper surface as in *A. g. percivali*, underside darker pure grey without any creamy tinge, throat grey like the rest of the under surface. Under wing-coverts brighter yellow.

A. g. gracilirostris: Birds from Angola, Gaboon, and Nigeria are not distinguishable from birds from the type-locality, Fernando Po. *A. g. poensis* Alexander was simply a redescription of the bird from the type-locality, it being very unlikely that there are two distinct birds on the island.

Birds from Sierra Leone, however, are not the same as the other western birds, but are slightly smaller, have shorter and more slender bills, and possess uniform creamy throats, with well-defined edges, and greyer under surfaces.

The Uganda birds inhabit the larger forests, frequenting the tops of the tall trees. They are especially common during the wild-fig season.

Localities. Kasala, Mubango, Mabira, Kyetema, Sezibwa River Forests, in Uganda.

Andropadus curvirostris.

♂ 1-29 ; ♀ 1-22. Collected throughout the year 1913-14.

Found in the forests, frequenting the tree-tops along with other forest Bulbuls. They have a sweet warbling song. Wing 78-85 mm.

Localities. Mabira, Mpumu, Kasala, Sezibwa River, Bugoma, and Mubango Forests, Uganda.

Andropadus curvirostris alexandri.

♂ 1-7. 14.i.14 ; 28.xii.11 ; 10.xii.13 ; 7.xi.14 ; 18.v.14 ; 7.xi.14 ; 3.v.14.

♀ 1-4. 24.vi.14 ; 10.xii.13 ; 8.xi.14 ; 7.iii.14.

These are large birds, similar in coloration to *A. curvirostris curvirostris*, except for the under wing-coverts, which are olive, and the throat, which is paler than the rest of the under surface. Wings, ♂ 84-89, ♀ 82-86 mm.

Localities. Sezibwa River, Mabira, Kyetema, and Kasala Forests, in Uganda.

Pycnonotus barbatus minor.

♂ 1-4. 7.ii.14 ; 10.xi.14 ; 7.xi.14 ; 17.x.14.

♀ 1-6. 20.vi.14 ; 7.xi.14.

A common species, quite distinct from *P. layardi* or *P. b. micrus*. These birds have quite a pleasant warble and are frequently heard at night-time. They frequent forests and open cultivated lands where there are trees and bushes. They nest twice a year.

Localities. Mabira, Mubango, Kyetema, Sezibwa River Forests, and Jinja, in Uganda.

Pycnonotus barbatus micrus. (Plate XI.)

Pycnonotus layardi micrus Oberholser, P. U.S. Nat. Mus. xxviii. 1905, p. 891 : Taveta, B.E. Africa.

♂ & ♀. 29. x. 14. And nestlings and imm.

Common in the forests and in gardens. They are most frequently seen in pairs. They nest from April to July, and from November to January.

We have taken the eggs of *Cuculus solitarius* and *C. caffer* from their nests. The nest of this species is quite small, but by the time the young Cuckoos are grown the nest becomes large and flat, and shows many evidences of being added to to meet the requirements of the occupants. Young of *C. solitarius* do not appear to eject all the eggs or young of their foster-parents, for on two occasions we have found nests occupied by one Cuckoo and two Bulbuls.

Localities. Nairobi and Kyambu, British East Africa.

Zosterops stuhlmanni.

♂ 1-5. 10. vi. 12 ; 14. iv. 12 ; 20. vii. 09 ; 30. iv. 10 ; 6. v. 12.

♀ 1-6. 5. ii. 12 ; 19. i. 12 ; 13. vi. 12 ; 6. v. 12 ; 6. v. 12 ; 7. ii. 14.

A common species, which can be distinguished from *Z. senegalensis* by its darker yellow colouring and the presence of a yellow forehead.

These birds build a beautiful hanging nest of grass, lined with fine grass-fibres. The eggs (two or three in number) are pure white or pure blue. They have been taken in February, April, and July.

These birds assemble in large flocks after the nesting-season is over.

One of the specimens procured has a greyish mantle and a wide buff-coloured band across the chest.

Localities. Kyetema, Mabira, Sesse Isles, in Uganda.

Zosterops flavilateralis.

♂. 10. vi. 13.

Seen in flocks and in pairs, in the forest and acacia country.



MENPES PRESS, WATFORD.

PYCNONOTUS BARBATUS MICRUS.

Localities. Embu and Kenia district, British East Africa.

Anthreptes axillaris.

♂ 1-8. 3. xi. 13; 14. v. 14; 27. ix. 13; 17. xii. 13; 24. ii. 14; 15. xi. 14; 17. i. 14.

♀ 1-8. 10. x. 14; 15. xi. 14; 15. xi. 14; 5. v. 14; 17. xii. 13; 5. iii. 14; 24. iii. 14; 27. ix. 13.

The Grey-headed Sun-bird has been procured in the Mabira Forest, also in the other large forests in the same locality.

This species keeps to the forests. A young bird was collected in May.

Localities. Mabira, Mubango, Sezibwa River, and Kyetema Forests, Uganda.

Anthreptes collaris hypodilus.

♂ 1-2. 13. iii. 12; 6. ix. 13.

♀ 1-3. 13. iii. 12; 25. vi. 14; 25. vi. 14.

This small Sun-bird frequents the open forests and gardens where there are trees and flowering shrubs. Young birds were obtained in June, and nests and eggs in May and June. The nest is small and neat, and is composed of grass-fibres and bark-fibres, especially from the wild heliotrope. The outside is adorned with lichens, leaves, and cobwebs; the inside is lined with vegetable-down. The eggs (two in number) are pale brownish-white or buff, with spots and streaks of dark brown.

Localities. Mabira, Mubango, and Kyetema Forests, Uganda; Kenia and Nairobi, in British East Africa.

Anthreptes tephrolæma.

♂ 1-5. 14. ii. 14; 12. ii. 14; 14. ii. 14; 13. ii. 14; 13. v. 13.

♀. 3. v. 14.

The Grey-chinned Sun-bird is not a common species, and, like others of this group, is found in the forests. Quite young birds were shot in April.

Locality. Mabira Forest, in Uganda.

Anthreptes longuemarei haussarum.

Anthreptes longmari haussarum Neumann, Orn. Monatsber.
xiv. 1906, p. 67 : Togoland.

♂ 1-2. 16.vii.12.

I am not satisfied that these birds are correctly named. We have birds from Chagwe Province which agree with *A. l. orientalis*, and others which agree perfectly with *A. l. haussarum*. Owing to insufficient material with which to work we can come to no definite conclusion.

This species is found in the acacia and forest country. It is not common.

Localities. Sio River, Mabira, and Busiro, in Uganda.

Chalcomitra acik æquatorialis.

♂ 1-3. Full plumage. 21.v.12 ; 26.vi.12 ; 30.iv.12.

♂ 1-3. Off colour. 7.vii.12 ; 27.i.12 ; 16.i.12.

♀ 1-3. 16.i.12 ; 26.v.12 ; 20.vi.12.

Nestling. 7.vii.12.

The Scarlet-breasted Sun-bird is very common in Uganda and parts of British East Africa. This species builds the most untidy nest of any Sun-bird. It is composed of grass and fibres, which are left long, and into these is woven a quantity of dead leaves, lichen, and bits of bark. The inside is lined with cotton-down and feathers. These birds select the same tree year after year on which to build. The eggs (one to two in the clutch) vary in colour, from a pale creamy-white to pale bluish, or greenish, with dark brown or grey-brown spots or longitudinal streaks. Nests were found from April to July, and again from October to January. Young, just from the nest, were taken in January, May, and July.

Localities. Kano and Kisumu, in British East Africa ; Kyetema, Chagwe, Toro, and Busoga Provinces, in Uganda.

Chalcomitra hunteri.

This species was seen on the coast, but not collected.

Locality. British East Africa coastal region.

Chalcomitra kirki.

♂ & ♀. 25. iv. 13.

This species was not collected by us in Uganda, but we found it common in British East Africa. Young birds were shot in May and June.

This is a scrub and open-forest species.

Locality. Nairobi, in British East Africa.

Chalcomitra angolensis.

♂ 1-2. 7. ii. 14; 6. i. 14.

Two males in full plumage, collected in Uganda, do not differ from *C. angolensis*. These birds are found on the outskirts of forest and in the scrub-country. Young birds were seen in January and June.

Localities. Mabira Forest and Jinja, in Uganda.

Cyanomitra obscura ragazzii.

♂ 1-8. 30. iv. 12; 5. xi. 14; 26. ii. 14; 10. vi. 14; 12. vi. 14; 13. vi. 14; 10. i. 14; 26. ii. 14.

♀ 1-5. 5. x. 14; 7. ii. 14; 14. i. 14; 23. vi. 14; 26. ii. 14.

Birds from Uganda agree perfectly with those from Shoa and north-eastern Africa. British East African specimens from Kikuyu are greener above and more olive on the underside; they have been named *C. o. neglecta*.

Typical *C. obscura obscura*, from Fernando Po, are pale birds.

This Sun-bird is a forest-species, keeping to the tops of tall trees. Breeding birds were shot in June and February, and young taken in June.

Localities. Kyetema, Mabira, Kasala, Mubango, and Sezibwa Forests, in Uganda; Kikuyu Forest and Kyambu, in British East Africa.

Cyanomitra cyanolæma.

♂ 1-3. 14. i. 14; 14. i. 14; 9. ix. 13.

♀ 1-5. 10. i. 12; 7. x. 14; 10. iii. 13; 26. iv. 14; 14. i. 14.

The Blue-throated Sun-bird is confined to the forest-clearings and the more open forests. Birds of both sexes from Uganda and Angola have a longer wing-measurement than those from Gaboon and Southern Nigeria by 5 mm.

Localities. Mabira, Mubango, Kyetema, and Kasala Forests, in Uganda.

Cyanomitra verticalis viridisplendens.

♂ 1-2. 27.i.13 ; 14.ii.14.

Juv. 1. 14.i.14.

Birds from Uganda agree with Reichenow's description. This is a forest-species, frequenting the undergrowth as well as the tree-tops.

Localities. Kyetema and Mabira Forests, in Uganda.

Cinnyris cupreus.

♂ 1-4. Full plumage. 17.xi.13 ; 3.iii.09 ; 15.vi.13.

♂ 3. Moults. 3.iii.09 ; 27.i.12 ; 6.i.12.

♀ 1-3. 10.v.12 ; 17.xi.13 ; 7.vii.09.

♀ juv. 14.v.12.

A very common species. It is found in the acacia-country, in forest-clearings, and in the scrub. They are local migrants, being common at certain times in any one place according to the food-supply.

We have taken their nests and eggs in March and June. The eggs are creamy to greenish grey, spotted or streaked with ash-brown, mostly towards the larger end.

Localities. Jinja, Kampala, Mabira, Kyetema, and Toro district, in Uganda ; Kisumu, in British East Africa.

Cinnyris superbus.

♂ 1-6. Full plumage. 24.vi.14 ; 10.xi.14 ; 7.xi.14 ; 7.xi.14.

♂. Moults. 17.v.14.

This fine bird is generally found round forests and in forest-clearings. Birds breed before attaining the full breeding-dress.

Localities. Mabira, Kasala, Sezibwa River Forests, and Bale, in Uganda ; Mumias, in British East Africa.

Cinnyris mariquensis suahelicus.

♂ 1-3. 20. vi. 12; 10. xii. 12; 21. xi. 10.

♀ 1-2. 20. vi. 12; 21. xi. 10.

This species is not uncommon in the Lake district. It is to be met with in the scrub and the acacia country. A nest taken in July at Kisumu was composed entirely of cotton-wool and vegetable-down, and lined with feathers. A few cobwebs were stretched on the outside. The eggs are creamy-white or pale greenish, with a few brownish specklings toward the larger end.

Localities. Lusasa, Ankole district, in Uganda; Kisumu and Kano, in British East Africa.

Cinnyris venustus igneiventris.

♂ 1-4. 25. iv. 12; 25. xi. 10.

In this race of *C. venustus* there is considerable variation in the intensity of the orange of the abdomen. It was common in western Uganda, where it fed freely on insects and nectar from the flowers of the numerous flowering shrubs.

Localities. Kibamba, Toro, and Ankoli districts of Uganda.

Cinnyris falkensteini.

♂. Full plumage. 14. vii. 12.

♂. Off plumage. 14. vi. 12.

♂. Juv. 9. vii. 12.

This is a common species in British East Africa. Some birds are almost as rich in colouring as *C. igneiventris*. A nest was found low down on an outside branch of a wild heliotrope, the structure being attached to the tip of it. Another nest was taken forty feet up a gum-tree. The eggs are creamy-white with a brownish tinge, spotted towards the larger end with dark brown.

Localities. Kisumu and Fort Ternan, in British East Africa.

Cinnyris chloropygius orphogaster.

♂ 1-3. 26. iv. 12; 19. xii. 12; 4. vi. 09.

These birds are all in adult plumage. They are found on

the outskirts of forests and in the scrub. Nests were found in May and again in September and October. Eggs are creamy-white with a greenish tinge when fresh, with ash-brown speckling round the larger end.

Localities. Majanji, Kyetema, and Buvuma Islands, in Uganda.

Nectarinia famosa.

♂ & ♀. 4.xi.10.

This pair was breeding in the scrub-country. These birds are intermediate between *N. famosa* and *N. cupreonitens*, and resemble birds labelled by Neumann in the Tring Museum with the MS. name *Nectarinia famosa centralis*. The bill is not so curved as in the latter species. The differences in coloration are so slight as to be only apparent when a series of each is laid out.

Locality. Lusasa, in Uganda.

Nectarinia cupreonitens.

Nectarinia famosa (Linn.); Reichenow, Vög. Afr. iii. p. 499 [part.].

♂ 1-2. 20.xi.13; 17.xii.12.

♀ 1. 20.xi.12.

These birds are found in the scrub-country, where there is an abundance of flowering plants. A nest was obtained at Nakuru. It was an untidy structure, composed of grass, leaves, and spiders' webs woven together, and lined with vegetable-down. Two eggs completed the clutch. These are pale creamy in ground-colour, with spots and streaks of ash-brown and greyish.

This was the commonest Sun-bird in the Nakuru district.

Localities. Nakuru and Londiana, in British East Africa.

Nectarinia pulchella.

♂. 15.xi.10.

This is not a common species. The male obtained is in full plumage. These birds are partial to old overgrown native gardens.

Locality. Ankoli, in Uganda.

Nectarinia melanogastra.

♂ 1-3. 14. vi. 12; 10. vi. 12; 12. vi. 12.

♀. 10. vi. 12.

Next to *N. erythrocerca* this was the commonest species in the scrub round Kisumu. The males are very pugnacious during the breeding-season. A breeding pair was shot at their nest. The nest was of the usual type, small and compact, composed of cobwebs, grass, and leaves and bits of bark; the inside lined with vegetable-down. The eggs are small and dark, having a graduated ground-colour, pale whitish at the apex, gradually darkening towards the larger end to brownish, the whole spotted and streaked with dark brown.

Localities. Kisumu and Kano, in British East Africa.

Nectarinia kilimensis.

♂ 1-6. 15. viii. 09; 5. xi. 10; 16. ix. 09; 8. xi. 14; 14. xi. 10; 7. viii. 09.

♀ 1-3. 14. xi. 10; 22. vi. 12; 8. xi. 14.

A common species, frequenting native gardens and the wild scrub-country. They were found nesting in June and November. The nest is usually attached to the end of some free-swinging twig about six to ten feet from the ground, and is made of grass, fibres, lichen, and bits of bark, bound together with cobwebs, the interior lined with down. The female bird does most of the nest-construction. The eggs are pale creamy or bluish, thickly or sparingly spotted and streaked with ash-brown.

Localities. Kyetema and Bwezu, in Uganda; Nairobi, in British East Africa.

Nectarinia erythrocerca.

♂ 1-9. 13. vii. 12; 18. vii. 12; 1. xii. 10; 17. vii. 07; 8. vii. 12; 5. vii. 09; 7. vii. 12.

♀ 1-3. 13. vii. 12; 2. vii. 12; 5. vii. 09.

This is a common species in the scrub and acacia country in Uganda and round Kisumu. The males have a short sweet song. Breeding birds, with their nests and eggs, were

collected in June and July, December and January. The majority of the nests contained one egg or young, and never more than two. The eggs are whitish, with longitudinal streaks of ash-brown and grey.

Localities. Kisumu, in British East Africa; Jinja, Kyetema, and Mpumu, in Uganda.

Drepanorhynchus reichenowi.

♂ 1-4. 19. vii. 12; 14. xii. 12.

♂. In moult. 22. vii. 12.

♀. 19. vii. 12.

This beautiful species was obtained on the outskirts of forests and in the wild scrub-country. A nest containing one egg was taken at Londiani. It was constructed of grasses, vegetable-down, and fibrès, and lined with coarse down. The egg is whitish in ground-colour, streaked evenly from point to point with ash-grey and pale brown.

Localities. Kyetema and Jinja, in Uganda; Nairobi, Londiani, and Ravine, in British East Africa.

Parus leucomelas.

♂. 5. xii. 12.

The Blue-black Tit is not very common. A few were seen in the forests. They were in pairs, and kept to the high trees. A bird was seen at its nesting-hole in March.

Localities. Iganga and Busoga, in Uganda.

Parus insignis.

♂ 1-2.

♀ 1. 9. x. 10.

Juv. 9. x. 10.

The Green-black Tit was common in the Toro district, where it frequented the tree-tops, especially flat-topped acacias. They capture a large proportion of their food on the wing. Young birds are dull black, with the white edgings of the wing tinged with dirty yellow.

Localities. Kyabaleka and Mabira, in Uganda.

Parus funereus.

♂ 1-3. 5.x.14.

♀ 1-2. 5.x.14.

Two adults and three immature specimens of this species were procured in the forests. They were in flocks of ten or more searching in the tree-tops for insects. They kept up a continuous piping call as they flitted about. The young birds represent two stages of the immature dress. In the first stage the plumage is dull black with little or no green gloss on the back and head, and the coverts have white terminal spots. In the second stage the head and upper surface is glossed and the underside is a deeper black, while the wings still retain the white terminal spots to the coverts. Birds in this first stage have been described as a separate subspecies, under the name of *P. griseoniger*.

Localities. Mubango and Mabira Forests, Uganda.

Parus albiventris.

♂ 1-2. 8.vii.13; 28.xii.12.

The White-bellied Tit was not seen in Uganda, but it was fairly common in British East Africa. They frequent the forests and gardens where there are tall trees. We had them breeding in our garden at Nairobi. They had their nest in a hole in a decaying tree-stump.

These birds were in large flocks in December in the Kyambu Forest.

Localities. Nairobi and Kyambu, in British East Africa.

Anthoscopus roccattii.

Anthoscopus roccattii Salvadori, Boll. Mus. Torino, xxi. no. 542, 1906, p. 2: Entebbe, Uganda.

♂ & ♀. 8.vi.12; 16.vi.12.

The Little Yellow-fronted Tit was occasionally seen in the forest. They were breeding in June. The nest is a beautiful structure, composed entirely of cotton-wool. It is pear-shaped, with an opening at one side towards the top. This opening is furnished with a short tubular entrance, and below this is a platform on which the birds alight before

entering the tube. The natives say that when the bird leaves the nest it stitches up the mouth of the tube. The nest is suspended from a slender twig. The eggs are pure white, long oval in shape, and usually three in number.

Localities. Kyetema and Kilinia, in Uganda.

Parisoma jacksoni.

♂ 1-2. 15. xii. 13; 28. xii. 14.

This Tit-Warbler is not a common species. We found it in the open forests in Uganda and in British East Africa.

Localities. Londiani, in British East Africa, and Mabira, in Uganda.

Parisoma plumbeum.

♂ 1-5. 20. xi. 14; 1. iii. 12; 26. v. 14; 15. xii. 12; 20. xi. 14.

♀ 2. 20. xi. 14; 16. xii. 12.

Imm. 7. ii. 14.

These birds were found flitting about in the undergrowth of the forests. They were fairly common. Young and immature birds were obtained, as well as freshly-moulted adults.

Localities. Mabira, Sezibwa River, Busiya, and Namwave Forests, in Uganda.

Melocichla mentalis amauroura.

Melocichla mentalis atricauda Reichw.; Reichenow, Vög. Afr. iii. p. 539.

♂ 1-6. 24. ii. 12; 22. x. 10; 21. ii. 12; 22. x. 10; 28. vii. 10; 28. ii. 12.

♀ 1-2. 13. v. 10; 1. v. 12.

Met with in the swamp and scrub country. Fairly common. They have a loud, though not unpleasant, warble.

Localities. Namuwira, Jinja, Bukurungu, Kyetema, in Uganda; Embu, in British East Africa.

Cisticola subruficapilla fischeri.

♂ 1-3. 2. vii. 12; 6. vii. 12; 24. vi. 12.

♀ 1-2. 24. vi. 12; 11. vi. 12.

A common species, inhabiting the scrub and grass lands. They are very noisy when disturbed, and their alarm-note is very harsh. Several pairs were found breeding in the scrub-country round Kisumu. The nest is constructed in the grass or in a small shrub. It is built of grasses, into which is woven bits of vegetable-down. The whole nest is a flimsy structure. The eggs are pale blue with black or brown spots, or they may be uniform blue. Nests have been taken in July and May and December.

Localities. Kisumu and Kano, in British East Africa.

Cisticola strangei.

♂ 1-10. 27. i. 12; 21. ii. 12; 24. iv. 12; 4. v. 12; 31. v. 12; 7. v. 12; 30. vii. 12; 18. viii. 12; 12. viii. 09.

♀. 10. i. 12; 21. ii. 12; 30. vii. 12.

It will be seen that this series is made up of birds shot in January, February, April, May, July, August; and of the so-called *Cisticola natalensis* we collected two specimens, shot in (♂) 3. iii. 09 and 1. v. 12. In the first series there are no birds in any way approaching the coloration of the second. An adult specimen of *C. strangei*, shot in July, is in moult on the dorsal region, and the sprouting feathers are dark, not light; another shot in August is in heavy moult, the fresh feathers are dark! A freshly-moulted specimen in fine, clean, dark dress is an August bird. Birds in the light brown plumage have been found breeding!

Localities. Jinja, Kyetema, Buziranjuvo, and Sanga, in Uganda.

Cisticola calamoherpe.

♂ 1-2, & ♀ 1. 15. ix. 12; 25. i. 12.

Not a common species; it was seen occasionally in the grass-country and in the scrub.

Localities. Nakuru, in British East Africa; Kyetema, in Uganda.

Cisticola terrestris hindei.

Cisticola brunnescens Heugl. ; Reichenow, Vög. Afr. iii. p. 559 [part.].

♂ & ♀. 15.vii.12.

This is a somewhat large pale form, which inhabits the open grass-country in British East Africa. They are fairly common, but difficult to procure.

Locality. Nakuru, in British East Africa.

Cisticola terrestris ugandæ.

Cisticola ugandæ Reichenow, Orn. Monatsber. xvi. 1908, p. 13 : Kwa Meema, Uganda.

♂ 1-2. 1.v.12.

These were breeding birds shot off their nest, which was practically on the ground, being slung between two grass-stems at the foot of a clump of grass. The nest was a semi-domed structure, composed of grass-blades and lined sparingly with fine grass. The two eggs are brownish, with fine darker spotting and a glossy surface.

Locality. Buziranjuvo, in Uganda.

Cisticola rufa hypoxantha.

Cisticola rufa (Fras.) ; Reichenow, Vög. Afr. iii. p. 567 [part.].

♂ 1-3. 1.v.12 ; 5.xi.12 ; 2.iv.10.

This little bird was found in the scrub-country. Its nest, with eggs, was taken in May. The nest was constructed between two leaves, which had been sewn together ; the nest proper was built of grass and lined with grass-flowers. The eggs are very small, of a white ground, with red-brown spots. It is not a common species.

Localities. Lusasa, Mbarara, and Buziranjuvo, in Uganda.

Cisticola cisticola uropygialis.

♂ & ♀. 7.xi.09 ; 14.ii.11.

Most frequently met with in pairs in the grass-country.

Localities. Mohokya and Bugaia, in Uganda.

Cisticola prinioides.

♂ 1. 17. xi. 12.

Not common; this species was breeding in the scrub in November.

Locality. Nakuru, in British East Africa.

Cisticola nuchalis.

♂ 1-4. 30. x. 10; 4. x. 10; 30. x. 10; 1. v. 12.

♂ 1-2. 1. ix. 10; 30. x. 10.

In trying to name these birds I have gone over the whole of this group in the Tring Museum. It appears to me that there are four distinct races, viz. :—

C. robusta, from north-east Africa. A large bird, with distinct black markings on the head and back, the brown of the head being dark and extending well beyond the nape on to the mantle.

C. ambigua, the East African form. Head not well marked, ground-colour pale chestnut to deep ochraceous, extending well over the nape. Mottling on the back subdued, the margins of the feathers not contrasting with the centre stripe.

C. (?), from Uganda, with a pale ochraceous head, not extending beyond the nape-markings of the crown, these markings are numerous, fine and dark, giving the crown a dark appearance; the mantle brightly marked, the edging to the feathers being pale greyish white, contrasting markedly with the black centres.

C. nuchalis Reichw., from Kagera, German East Africa. A bird with a dark brown head with a few large dark markings, the brown being continued on to the mantle as a brown wash; the mantle dark, the edging to the feathers being brownish grey, not contrasting with the brown-black centre stripe.

Uganda birds have a wing-measurement of 63-66 mm. (males), 54-60 mm. (females).

These birds nest close to the ground, building a domed nest amongst the grass or in a small shrub. The nest is

composed of grass and lined with grass-fibres. The eggs vary, but the majority are white with reddish spots; two to three form the clutch. The nesting season depends on the rains.

Localities. Buziranjuvo, Mukombo, and Kyetema, in Uganda.

Cisticola robusta ambigua. (Plate XII.)

♂. 14. vi. 13, and nestlings.

Nests of this species have been taken from March to July and in December and January. The nest is built on the ground, is domed, and is composed of grass and lined with grass-fibres. The eggs are blue or whitish, spotted with brown-black or uniform, or with indistinct brownish markings; two to three are laid. We have taken the eggs of *Chrysococcyx cupreus* and *C. klaasi* from these nests.

Localities. Nairobi and Kyambu, in British East Africa.

Cisticola lugubris.

♂ 1-2. 2. vii. 12; 2. vii. 12.

♀ 1-2. 2. vii. 12; 2. vii. 12.

This species is not common in Uganda, but in British East Africa we saw it in fair numbers amongst the tall rank grass by the side of swamps and lakes.

These specimens do not quite agree with the examples of *C. lugubris* at Tring. They have deep chestnut-coloured heads, and mantles which are indistinctly mottled and washed with chestnut; the under surface is more ochraceous. These birds were shot off their nests. This is placed in the grass or in a stunted shrub, and is composed of a few grass-blades, between which is woven a quantity of cotton-wool and vegetable-down; the lining is of cotton-wool. The eggs are pale pink, with brick-red and liver-coloured spots. Four to five eggs are laid.

Locality. Kisumu, in British East Africa.

Cisticola cinerascens.

Cisticola semitorques (Heugl.); Reichenow, Vög. Afr. iii. p. 563 [part.].



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CISTICOLA ROBUSTA AMBIGUA.

♀ & juv. 7. vi. 13.

This bird is quite distinct from *C. semitorques*. It has dark ear-coverts and has no superciliary stripe. It is a common species, inhabiting the bush- and grass-country. Nests have been taken from March to July and from November to January. The nest is built either entirely of grass and lined with vegetable-down, in a grass-clump or stunted shrub, or it is constructed between two leaves which have been stitched together below and behind, or several leaves may be woven or stitched to the nest after it has been partially built. The eggs vary from white to blue, greenish, pink or buff, with distinct or subdued, fine ash-brown markings.

Young birds are very much browner than adults, the colour of the crown is the same as the mantle, and the edgings to the wing-feathers are much brighter rusty brown.

Localities. Nairobi and Embu, in British East Africa.

Cisticola rufopileata emini.

♂. 29. ix. 10.

I am not satisfied that this is a good subspecies. Is it not *C. lateralis* in the intermediate plumage?

Locality. Mubendi Plains, in Uganda.

Cisticola lateralis.

♂ 1-3. 25. ii. 11; 24. ii. 12; 4. v. 12.

The birds from Uganda do not agree with those from the type-locality. They lack the rusty-brown edgings to the secondaries and primaries, the flanks are much darker, and they are much browner on the upper surface. These birds inhabit the scrub-country.

Localities. Sanga and Kigalama, in Uganda.

Cisticola erythrops.

♂ & ♀. 9. vi. 13; 10. vii. 12.

This bird has a song quite unlike that of any other Warbler. It is loud and carries a long distance, and is only uttered when the bird is hidden in the depths of some

bush or reed-bed. These birds are usually found in the scrub and reed-beds by rivers and swamps. It invariably builds its nest between two or three broad leaves which it has stitched together. The nest proper is constructed first of grass-blades, then a thick felting of vegetable-down. The eggs are always pale greenish or bluish green, with liver-coloured and brick-red spots. Two to four eggs are laid. They nest twice a year.

Localities. Embu and Nairobi, in British East Africa; Sio River and Jinja, in Uganda.

Calamocichla jacksoni.

Calamocichla leptorhyncha (Reichw.); Reichenow, Vög. Afr. iii. p. 575 [part.].

♂. 2. vii. 12.

These birds are very shy and difficult to procure. They live in the dense papyrus and reed-beds of swamps.

Locality. Kisumu, in British East Africa.

Calamocichla ansorgei nilotica.

Calamocichla ansorgei nilotica Neumann, Nov. Zool. xv. 1908, p. 246; Wadelai.

♂ & ♀. 2. vii. 12.

Found in the dense papyrus-swamps. They were breeding in July. The nest was placed on the top of a flowering papyrus-stem; it was constructed of papyrus tendrils and fibres. The eggs were greyish white with a few black-brown spots. We procured photographs of the parents at the nest when the young had hatched.

These birds have a longer and wider bill than *C. ansorgei*.

Locality. Kisumu, in British East Africa.

Calamocichla gracilirostris.

♀. 28. xii. 14.

This is another of the rare Papyrus Warblers of which little is known. They have a deep throaty warbling note like "Curoo, uroo, uroo." They were breeding in June, but we were unable to locate the nest.

Locality. Kyambu Swamp, in British East Africa.



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PRINIA MYSTACEA.

Schœnicola apicalis.

♂ & ♀. 27. ix. 10.

Not very common. A nest was procured in September.

Localities. Kyakasengula and Jinja, in Uganda.**Bradypterus centralis.***Bradypterus bradypterus centralis* Neumann, Bull. B. O. C. xxi. 1908, p. 55 : German E. Africa.

♂ 1-2. 10. vii. 12 ; 15. iv. 14.

A nest of this species was procured in April in a reed-bed. It was a deep cup-shaped structure, composed of coarse grass on the outside and lined with fibres on the inside. The eggs are dirty pinky white, with red-brown and violet-grey spots. Two were laid.

Locality. Nairobi, in British East Africa.**Acrocephalus palustris.**

♂ 1-2. 6. xi. 12 ; 27. xi. 12.

♀ 1. 6. xi. 12.

Occasionally obtained when on migration. One specimen is very pale on the underside.

Locality. Nakuru, in British East Africa.**Prinia mystacea.** (Plate XIII.)

♂ 1-7. 15. vi. 12 ; 26. xi. 10 ; 31. vii. 09 ; 7. v. 12 ; 24. iv. 12 ; 26. ix. 10 ; 26. xi. 10.

♀ 1-5. 31. v. 12 ; 26. vi. 12 ; 31. vii. 09 ; 31. vii. 09 ; 2. vii. 12.

In this series the birds are all of one type. This group has been sadly neglected and many good forms lumped together. For example, the bird from Sierra Leone is small and dark, those from British East Africa and Uganda larger and paler, those of Angola and Tanganyika very rufous, while the southern birds are pale and the largest of the group.

Nests and eggs have been taken several times. It is a common species.

Localities. Kisumu and Kano in British East Africa ; Magada, Kyetema, Chambura, and Kyakasengula, in Uganda.

***Prinia reichenowi*.**

♂ 1-7 ; ♀ 1-6. Collected throughout the year 1913-1914.

Common in the scrub and in the open forests. These birds build nests like *Cisticola erythrops*.

Localities. Mabira, Mpumu, Kyetema, Nagunga, Busiro, and Sezibwa River, in Uganda.

***Apalis rufogularis denti*.**

Apalis denti O.-Grant, Bull. B. O. C. xix. 1907, p. 86 : Mpanga Forest, Uganda.

♂ 1-5. 3.v. 12 ; 10.v. 14 ; 17.xi. 13 ; 17.xii. 13 ; 5.xi. 14.

♀ 1-5. 2.iv. 12 ; 5.v. 14 ; 9.ix. 13 ; 25.vi. 14 ; 17.xii. 13.

Males are slightly larger than females, and have the brown of the throat and crop much darker and the back and rump greener. In one specimen the abdomen is very ochraceous, so that it is practically the same colour as the throat. This was a common species in the forests, where it kept to the tree-tops.

Localities. Mabira, Kyetema, Kasala, and Sezibwa River Forests, Uganda.

***Apalis jacksoni*.**

♂. 5.iv. 12.

♀. 15.xii. 14.

Not a common species. Found in the larger forests, where it keeps to the tall trees.

Localities. Mawakota and Mabira Forest, Uganda.

***Apalis nigrescens*.**

Euprinoides nigrescens Jackson, Bull. B. O. C. xvi. 1906, p. 90 : Ruwenzori.

♂ 1-9. 7.v. 14 ; 14.ii. 14 ; 31.v. 12 ; 23.vi. 14 ; 27.xii. 11 ; 14.ii. 14 ; 7.ii. 14 ; 10.xi. 14 ; 7.ii. 14.

♀ 1-2. 8.x. 14 ; 30.v. 12.

Imm. 1-2. 7.i. 14 ; 10.xi. 14.

Common in the forests, where they may be seen moving

about the tree-tops. The presumably young birds are dark olive-green above, with the crown washed with brown; the underside white with a creamy tinge; the flanks washed with greyish olive. Wing-feathers edged with olive-green; loreal spot grey; upper eyelid pure white! These birds differ so much from adults that I am not satisfied that these are young of this species.

Localities. Mubango, Kasala, Mabira, and Kyetema, also on the wooded banks of the Sezibwa River, in Uganda.

Apalis collaris.

Apalis nigriceps collaris van Someren, Bull. B. O. C. xxxv. 1915, p. 107: Bugoma Forest, Uganda.

♂ 1-7. 17.xii.13; 5.v.14; 17.xii.13; 17.i.14; 16.x.13 [*Type*]; 16.x.13; 7.ii.14.

♀ 1-3. 26.vi.14; 17.xii.12.

Imm. 3.

This bird was recently described. It differs from *A. nigriceps* in the colour of the three outer pairs of tail-feathers, which are white for their entire length; in the much more golden-yellow uppersides, and in having a broad bright yellow band on the hind neck.

Immature and young birds are represented in this series. It is a forest-species which keeps to the tree-tops; they go in pairs or small flocks of from four to six.

Localities. Mabira, Bugoma, Kasala, and Ituri Forests, in Uganda.

Apalis flavocincta.

♂ & ♀. 20.vi.14.

This pair had a nest in my garden, they built it in the fork of the topmost bough of a fir-tree. The nest—a small semi-domed structure—was composed of lichen, vegetable-down and cobwebs, and was well padded inside with cotton-down. Three eggs were laid, oval in shape, of a bluish-green ground, with a few scattered spots of liver-colour and brown.

Localities. Nairobi and Kyambu, in British East Africa.

Eminia lepida.

♀. 22. vii. 12.

Not a common species. It frequents the undergrowth of forests and the scrub-country. It has a beautiful song. They were breeding in May.

Locality. Chagwe, Uganda.

Eminia hypochlorus.

Eminia hypochlorus Mearns, Smithson. Misc. Coll. Washington, lvi. no. 20, 1911, p. 10 : Wambugu, B. E. Africa.

♂. 29. vi. 14.

We have frequently come upon these birds in the dense forest-undergrowth and in the scrub, and though they had nests in the locality we could not find them. It is not a common bird.

Localities. Nairobi and Kyambu, in British East Africa.

Macrosphenus zenkeri.

♂ & ♀, 2 each. 14. ii. 14 ; 17. xii. 13 ; 29. xii. 14.

All these birds are adults and are not young of *M. flavicans*. Wings, ♂ 58 mm., ♀ 53-54 mm.

Localities. Mabira and Kyetema Forests, Uganda.

Macrosphenus flavicans ugandæ.

Macrosphenus flavicans ugandæ van Someren, Bull. B. O. C. xxxv. 1915, p. 126 : Mabira Forest, Uganda.

♂ 1-6. 14. i. 14 [*Type*] ; 7. ii. 14 ; 17. xii. 13 ; 5. x. 14 ; 17. xi. 13.

♀ 1-6. 13. iii. 13 ; 14. ix. 13 ; 7. ii. 14 ; 17. xi. 13.

The Uganda birds, which I have described under the above name, are altogether brighter than *M. flavicans*. The bill is longer. Wings, ♂ 63-65 mm., ♀ 57-63 mm.

Localities. Mabira, Kasala, and Mubango, in Uganda.

Camaroptera tincta.

Camaroptera griseoviridis (v. Müll.) ; Reichenow, Vög. Afr. iii. p. 616 [part.].

♂ 1-7. 10. xii. 12 ; 23. vi. 14 ; 4. v. 12 ; 9. ix. 13 ; 5. x. 14 ; 24. vi. 12 ; 25. i. 12.

♀ 1-5. 8.i. 12; 31.iii. 12; 12.ix. 13; 7.ii. 14; 6.vi. 12.
Imm. 6.vi. 12; 6.x. 14.

A common species. We have taken nests in April, May, and June, and again in December and January. Two leaves are sewn together, and then the nest is built between them and is composed of grass, bark-fibres, and a few hairs. The eggs may be white, or white with reddish-brown spots.

Localities. Kyetema, Mpumu, Mabira, Kasala, and Kabamba, in Uganda.

Camaroptera griseigularis.

Camaroptera griseoviridis (v. Müll.); Reichenow, Vög. Afr. iii. p. 616 [part.].

♂ & ♀. 18.vi. 14.

This is a dark bird, with a dark grey underside without any white. Its nests and eggs are exactly like those of the preceding species.

Locality. Nairobi, in British East Africa.

Camaroptera toroensis.

Sylviella toroensis Jackson, Bull. B. O. C. xv. 1905, p. 38: Toro, Uganda.

♂ 1-6. 24.ii. 14; 7.v. 14; 19.x. 13; 17.xii. 13; 17.xii. 13.

♀ 1-4. 17.xii. 13; 24.ii. 14; 8.ii. 14; 17.i. 14.

This species turned out to be quite a common bird. It frequented the forest-undergrowth, and was noisy. Wings, ♂ 54-58, ♀ 48-50 mm.

Localities. Bugoma, Mabira, and Kasala Forests, in Uganda.

Camaroptera brevicaudata pulchra.

Camaroptera brevicaudata pulchra Zedlitz, J. Ornith. lix. 1911, p. 331: Angola.

♂ 1-2. 2.xii. 14; 17.ii. 14.

♀ 1. 14.ix. 13.

Count Zedlitz has separated these birds into several subspecies, but some of them are not good ones. Uganda birds are very near *C. pulchra*, but differ in having the cheeks

and ear-coverts olive-green, with only a slight tinge of golden, and in having the abdomen pure white—not creamy. Wings, ♂ 50, ♀ 48 mm.

Localities. Kyetema and Mabira Forests, in Uganda.

Hylia prasina.

♂ & ♀ 1-4. Collected throughout the year 1913-14.

There appears to be no difference between birds from East and West Africa. There is one specimen in this series with a wing of 74 mm.

These are forest-birds and are very common.

Localities. Namwave, Mabira, Bugoma, Kasala, and Kyetema Forests, Uganda.

Stiphornis xanthogaster mabiræ.

Stiphornis mabiræ Jackson, Bull. B. O. C. xxv. 1910, p. 85 : Mabira Forest, Uganda.

♂ 1-4. 14. ix. 13 ; 17. xi. 13 ; 3. ix. 13 ; 10. iii. 14.

♀ 1-2. 14. ix. 13 ; 17. i. 14.

Juv. 17. xi. 13.

These birds agree well with Jackson's description, but I would add that the flanks are very much darker than in *S. xanthogaster*, and the lower surface from the crop to the under tail-coverts is a rich creamy colour ; while the bill is shorter.

This is a forest-species which keeps to the thick undergrowth. Young birds have rusty mottlings on the back ; the secondary and tertiary coverts tipped and edged with rusty, and the pale yellow of the throat and breast finely barred with olive. Female birds have dark grey cheeks, and males black.

Locality. Mabira Forest, Uganda.

Sylvietta carnapi.

♂ 1-2. 24. ii. 14 ; 23. iii. 12.

These birds were met with in the forest and in the thick scrub. They are not uncommon, but very shy and difficult to procure.

Localities. Mabira and Kyetema, in Uganda.

Sylvietta baraka.

Sylvietta virens Cass. ; Reichenow, Vög. Afr. iii. p. 631 [part.].

♂ 1-3. 7. xi. 14 ; 19. x. 14 ; 7. ix. 13.

This rather rare bird was occasionally seen in the forest-undergrowth. Little is known of its habits.

Localities. Sezibwa River and Mabira Forests, and Nazigo, in Uganda.

Phylloscopus trochilus.

1-15 specimens collected between August and March 1913-14.

Localities. Mabira, Kyetema, Kivuvu, Kaina, and Nam-wave Forests, in Uganda ; Nakuru, Londiani, and Nairobi, in British East Africa.

Sylvia simplex.

♂ 1-3. 5. xi. 14 ; 5. xi. 14 ; 23. ix. 10.

♀ 1. 1. iv. 12.

Two of these birds are normal, while two are very large. The bills are narrow and long, measuring from nostril to tip 7.75 mm., and wings of 80-82 mm. There is no doubt that these birds are *S. simplex*, but can they be a large continental form which has not been recognised ?

Localities. Mabira and Kyetema, in Uganda.

Sylvia atricapilla.

♂ 1-3. 26. xii. 12 ; 24. ii. 12 ; 27. xi. 12.

♀ . 27. xi. 12.

One meets with a good many of this species during the winter. They sing freely.

Localities. Busiya, Jinja, in Uganda ; Nakuru, in British East Africa.

Sylvia sylvia.

♂ 1-2. 13. x. 12 ; 13. x. 12.

♀ 1. 13. x. 12.

These birds are in clean fresh plumage, the males being as brightly coloured as in spring. They sing most lustily.

Locality. Nakuru, in British East Africa.

Crateropus hypoleucus.

Juv. 14. iii. 13.

The White-bellied Babbling Thrush is a common species in British East Africa, frequenting the outskirts of forests, the scrub, and plantations.

They are noisy birds, and their cry is harsh and oft-repeated. They were found breeding in February and March, a nest with eggs was collected in February, and one with young towards the end of March.

Localities. Nairobi, Kyambu, and Kenia, in British East Africa.

Crateropus sharpei.

♂ 1-2. 29. ix. 10 ; 27. v. 10.

♀. 27. v. 10.

Sharpe's Babbling Thrush takes the place of *C. hypoleucus* in Uganda, and like that species is very noisy. Their cry has been likened to the howling of a tom cat, so that they have received the name of Cat-bird.

Nests and eggs were taken in May and again in September. The nest was composed of rootlets and grass. The eggs are blue ; two to three are laid.

Localities. Kyabalinga and Kalwanga, in Uganda.

Crateropus emini.

Crateropus jardinei hypostictus Cab. & Reichw. ; Reichenow, Vög. Afr. iii. p. 660 [part.].

♀. 15. iii. 11.

This Cat-bird or Babbling Thrush was not common. A few pairs were seen in the acacia-country. The bird obtained had large ovaries.

Locality. Mohokya, in Uganda.

Turdus elgonensis.

♂ 1-2. 14. xii. 14 ; 17. xi. 12.

Common on the outskirts of forests and in the taller scrub. They were nesting in April and May, and had young in June.

Localities. Londiani and Nairobi, in British East Africa.

Turdus pelios centralis.

♂ 1-4. 5.x.10; 5.x.10; 3.xi.14; 24.i.12.

♀ 1-2. 10.vi.12; 5.x.14.

Common. Exhibits great variation in plumage. Breeds from April to June and in October and December. The nest is like a Blackbird's, so also are the eggs, though some resemble the eggs of the Missel-Thrush.

Localities. Kyetema, Fortportal, Sezibwa River, and Mubango, in Uganda.

Monticola saxatilis.

♂ & ♀. 15.xii.12.

Common as a migrant, frequenting the open country.

Locality. Busiya, in Uganda.

Thamnodæa subrufipennis.

♂ & ♀. 31.vii.06.

This is not a common bird; we met with it in the scrub-country.

Locality. Lwala, in Uganda.

Myrmecocichla cryptoleuca.

♂. 17.ix.12.

This specimen is almost a complete albino. The nesting season is from March to July and from December to January. They nest in holes in banks, and the eggs are pure white.

Locality. Nakuru, in British East Africa.

Myrmecocichla cryptoleuca nigra.

♂ 1-3. 31.vii.06; 24.ii.12; 25.iii.11.

♀ 1-4. 25.iii.11; 1.i.09; 31.vii.06.

♀ imm. 31.vii.12.

This bird takes the place of *M. cryptoleuca* in Uganda. It is a common bird, nesting in holes in ant-hills and in sand-banks. The nest proper is composed of rootlets and grass. The eggs (three to four) are white. These have been taken in May, June, and October.

Localities. Jinja, Lwala, Buziranjuvo, Kabamba, and Hoima, in Uganda.

Saxicola pileata.

♂ 1-2. 10. ix. 12; 17. vii. 13.

A common species.

Localities. Naivasha and Nakuru, in British East Africa.***Saxicola isabellina.***

♂. 18. xii. 12.

Met with on migration, but is not common.

Locality. Busiya, Uganda.***Saxicola œnanthe.***

♂ & ♀ 1-12.

Collected from September to December. Common in the open country during the winter.

Localities. Busiya and Kabulamuliro, in Uganda.***Saxicola leucorhoa.***

♀. 10. ix. 12.

This female specimen has a wing-measurement of 105 mm.

Locality. Nakuru, in British East Africa.***Saxicola pleschanka.***

♂ 1-2. 14. ix. 12; 18. xii. 12.

Fairly common in the open grass-country and rocky plains. One male is in full plumage, while the other is evidently immature.

Localities. Busiya, in Uganda, and Nakuru, in British East Africa.***Pratincola rubetra.***

♂ 1-4; ♀ 1-3.

Collected from October to January. One male shot in October is in full plumage.

Localities. Busiya and in Toro district, Uganda.***Pratincola salax axillaris.****Pratincola salax* Verr.; Reichenow, Vög. Afr. iii. p. 733 [part.].

♂ 1-3. 6. viii. 09; 7. xi. 10; 7. xi. 10.

♀ 1-2. 26. ix. 10; 4. xi. 10; 7. xi. 10.

Common. They were breeding in May. The nest was built in a small depression in a bank, overhung with grass. It was composed of rootlets and lined with grass-fibres and hairs. It contained two young birds.

Young birds were also shot in October and November, so that these birds must also have eggs in October or the end of September. There are few East African birds which do not breed twice a year.

Localities. Kisala, Kitoon, Mbarara, Kyakasengula, in Uganda.

Pratincola salax.

♂ 1-2. 14. xii. 13 ; 17. xii. 13.

♀ . 19. iv. 13.

This species is larger than the Uganda bird. They were nesting in May. The nest was built in a slight hole in the side of an open earth-ditch. It was made of rootlets and grasses, and lined with fibres and hairs. The eggs are dirty olive-green, spotted and blotched with brown; the surface is glossy.

Localities. Nakuru, Ravine, and Kabete, in British East Africa.

Turdinus ugandæ.

Turdinus ugandæ van Someren, Bull. B. O. C. xxxv. 1915, p. 125 : Sezibwa River Forest, Uganda.

♂ 1-6. 6. xi. 14 ; 16. xi. 14 [*Type* ♂] ; 4. v. 12 ; 6. xii. 14 ; 16. xi. 14.

♀ 1-5. 6. xii. 14 ; 30. iv. 14 [*Type* ♀] ; 22. iii. 13 ; 12. xi. 13.

These birds differ from *T. fulvescens* in having the throat pure white and the under surface paler. They inhabit the undergrowth of forests, and are difficult to procure.

Localities. Kyetema, Mabira, Kasala, and Sezibwa River Forests, in Uganda.

Turdinus barakæ.

Turdinus barakæ Jackson, Bull. B. O. C. xvi. 1906, p. 90 : Toro, Uganda.

♂ 1-4. 16. ix. 13; 17. viii. 13; 26. ii. 14; 27. ix. 12.

♀ 1-4. 26. ii. 14; 14. x. 13; 2. v. 14.

Mr. Ogilvie-Grant asserts that these birds cannot be separated from *T. rufipennis* of Sharpe, formerly known as *T. fulvescens* of Sharpe and Grant (*vide* Report on Ruwenzori Expedition, Trans. Zool. Soc. xix. 1910, p. 379). I cannot agree with this. No birds in any way resembling *T. barakæ* have been procured in Angola, Cameroons, or anywhere on the West Coast. The bird which most nearly resembles *T. rufipennis* is *T. albipectus* of Reichenow, a form which, I think, is quite a good species.

This is a forest-species which keeps to the undergrowth. It is rare.

Localities. Mabira and Kasala Forests, Uganda.

Turdinus minutus.

Turdinus albipectus minutus van Someren, Bull. B. O. C. xxxv. 1910, p. 126: Mabira Forest, Uganda.

♂. 2. x. 13 [*Type*].

This is a very small species, with a wing-measurement of 65 mm. It resembles *T. albipectus* somewhat in general coloration, and also *T. rufipennis*, but it is paler on the flanks, centre of abdomen creamy (not white), cheeks grey, loreal spot not distinct, thighs dark olive-grey.

This is a forest-species, and is rare. It was shot in the thick undergrowth.

Locality. Mabira Forest, in Uganda.

Turdinus albipectus.

♂ 1. 17. i. 14.

♀ 1-3. 24. ii. 14; 14. x. 13; 2. v. 14.

I am certain that these birds are quite distinct from *T. barakæ* and *T. rufipennis*. They are dark olive-brown birds, with pale throats and whitish centres to the under surface. Unfortunately, I cannot examine Reichenow's type, in order to be certain that these specimens are similar to his *T. albipectus*.

Localities. Mabira and Kyetema Forests, in Uganda.

Alcippe abyssinicus.

♂ & ♀. 17 xi. 13; 28. xii. 14.

This is a rare species, found sparingly in Uganda and British East Africa. It is a forest-bird.

Localities. Londiani, in British East Africa; Kyetema, in Uganda.

Alethe woosnami.

Alethe woosnami O.-Grant, Bull. B. O. C. xix. 1906, p. 24: Ruwenzori, Uganda.

♂ 1-2. 6. v. 14; 19. x. 13.

♀. 15. x. 12.

Imm. 1. 19. x. 13.

These birds are nearer to *A. poliothorax* than to *A. diadematum*.

Young birds in first plumage are speckled. The feathers of the crown, mantle, rump, and coverts are blackish with bright ochraceous centres. The upper tail-coverts golden-brown edged with black. The primaries and secondaries blackish with an olive-brown wash, more especially on the outer webs. The secondary-coverts olive-brown with ochraceous terminal spot. Tail black. Feathers of the underside bright ochraceous with black edges, except on the abdomen and under tail-coverts, which are uniform. The throat is pale ochraceous. Upper mandible horny-black, lower pale horny-brown tipped with black. Feet greyish brown. Wing, in adult ♂ 92-93 mm., ♀ 86-88 mm.

Localities. Mabira, Jinja, and Bugoma Forests, in Uganda.

Alethe carruthersi.

Alethe carruthersi O.-Grant, Bull. B. O. C. xix. 1906, p. 25: nr. Entebbe, Uganda.

♂ 1-5. 19. x. 13; 24. ii. 14; 19. x. 13; 7. x. 14; 14. x. 14.

Imm. 19. x. 13.

♀. 19. x. 13; 27. ix. 13.

Fairly common in the dense forest, where it frequents the undergrowth. An immature bird, moulting from first to

second plumage, was shot in October. The general colouring is very like that of the young *A. woosnami*, just described, but the colouring is darker above and the underside paler.

Localities. Mabira, Bugoma, and Mubango Forests, in Uganda.

Cossypha caffra iolæma.

♂ 1-2. 4. xii. 13; 16. v. 12.

♀ 1. 9. v. 12.

Fairly common in the scrub and on the outskirts of forests. It is a beautiful singer. Nestlings were procured in December.

Localities. Nakuru and Nairobi, in British East Africa.

Cossypha natalensis.

♂ 1-5. 20. vi. 14; 20. vi. 14; 14. iii. 14; 14. x. 14; 4. i. 12.

♀ 1-3. 6. v. 14; 7. x. 13; 9. iv. 12.

In this series there are birds with brown backs and others with slaty-grey backs. This variation is not accounted for by age or sex, according to our birds. Several subspecies have been described by American ornithologists, descriptions of which agree well with the examples before me, but I doubt if there are even two distinct subspecies here. One of our specimens has a wing-measurement of 98 mm. and a tail of 90 mm.

These birds were nesting in April and May. The nest is generally placed in a crevice in an old tree or rock, not high up, and is constructed of rootlets, moss, and fibres. The eggs (two in number) are dark olive-green or olive-green with brownish mottlings.

Localities. Mabira, Kyetema, Kasala, Mpumu, Jinja, and Mubango, in Uganda.

Cossypha somereni.

Cossypha somereni Hartert, Bull. B. O. C. xxxi. 1912, p. 3: Kyetema nr. Kampala, Uganda.

♂ 1-3. 8. xi. 14; 10. v. 14; 14. i. 11 [*Type of the species*].

♀ 1. 8.xi.14.

Imm. ♂ 1. 3.x.14.

We have now a series of three adult males, one immature male, and one female. These agree in every detail with the type, which, as stated by Dr. Hartert, was compared with the types of *C. polioptera* and *C. nigriceps* by Prof. Neumann. The series bears out the original description in every point except that of the superciliary stripe. There are even in the type a few black-tipped feathers. The wing of *C. polioptera* is given as 74 mm. In these specimens it varies from 78 mm. (♀) to 84 mm. (♂).

The young bird has the feathers of the crown dark ochraceous, with each feather edged with black. A few white feathers are present, just above the eye. The back, under surface, and tail are lighter in colour than in adults. The uppermost secondaries are edged with ochraceous, while the secondary and lesser coverts are edged and tipped with the same colour.

They nest in June and October, and the eggs are olive-green. They are birds of the forest-undergrowth, and are accordingly easily overlooked.

Localities. Mabira, Kyetema, Kasala, Wabigenge River, and Sezibwa River, in Uganda.

Cossypha cyanocampter bartteloti.

♂ 1-2. 14.xi.13; 3.iii.13.

♀ 1-4. 7.iii.14; 3.xi.13; 2.ii.14; 14.xi.13.

Imm. ♂ 1. 27.ix.13.

This is the pale form of *C. cyanocampter*, the type of which came from the Aruwimi River. Unfortunately, I have no specimens from the type-locality to compare with my birds. A young bird in first plumage was shot in September. It is mottled and lacks a superciliary stripe, and has no blue on the shoulder.

This is a shy and retiring bird which keeps to the thickets of the forest.

Locality. Mabira Forest, Uganda.

Cossypha heuglini.

♂ 1-8. 19.vii.10 ; 26.xi.10 ; 28.ix.10.

♀ 1-2. 17.ix.12 ; 25.ix.10.

Common. It frequents the forests and the scrub-country. It is a fine songster. It was nesting in May, June, and October.

Localities. Kasaka and Mpumu, in Uganda ; Nairobi, in British East Africa.

Cossypha verticalis melanonota.

♂ 1-3. 4.v.12 ; 4.v.12 ; 14.ii.11.

♀ 1-2. 8.11.14 ; 27.iv.12.

This is a forest-species, but is sometimes seen in the scrub. It nests in May and November. It is quite a good songster and mimic.

Localities. Kyetema, Magada, Mabira, and in the Ankoli district, in Uganda.

Erythropygia ruficauda.

♂ 1-2. 14.v.12 ; 14.v.12.

♀ 1-2. 10.x.12 ; 14.v.12.

This bird is a fine songster, singing most lustily just before sunset. It is found in the scrub-country, frequenting the tangled undergrowth. In action, it reminds one of the Robin.

Localities. Kano and Kisumu, in British East Africa.

Erythropygia hartlaubi.

♂ 1-2. 13.iii.12 ; 12.viii.12.

♀ 1. 13.iii.12.

These birds were seen in the scrub and grass country in pairs. They were observed feeding on the ground.

Localities. Kabamba, Jinja, and Busiro, in Uganda.

Aëdon lucinia.

♂ 1-2. 2.ii.14 ; 6.x.12,

These birds sang in the garden for two consecutive evenings ; one was shot and the other caught in a trap. It is the dark Nightingale.

Localities. Nakuru and Nairobi, in British East Africa.

XXI.—*Note on the Distribution and Nesting-habits of Falco peregrinus pealei* Ridgway. By C. DE B. GREEN, Penticton, British Columbia.

WHERE do the ranges of *Falco peregrinus anatum* and *F. p. pealei* overlap? The latitude has not been decided yet. It is no doubt somewhere on the coast of Vancouver Island, possibly even south of lat. 49° , though probably north of lat. 50° .

In 1912 a young bird of *F. p. anatum* was secured in lat. 53° , but further search seems to prove that it was a wanderer.

Queen Charlotte Islands lie north of Vancouver Island, separated by Queen Charlotte Sound, sixty miles wide. The southerly island of Queen Charlotte group has not been examined, but birds shot at the north end of that island were undoubted *F. p. pealei*. Graham Island, which is separated by a channel only a mile wide from Moresby, has been carefully searched since 1910, and all birds breeding there are *F. p. pealei*. Two eyries at the south end belonged to birds of this race, and the north coast held fifteen eyries of *F. p. pealei* when examined in 1915.

The isolated Falcons at lonely points on the coast were living chiefly upon duck, chickens, and sandpipers, but the congregation of *F. p. pealei*—thirteen eyries at the north-west corner of the main island and on the rocky shores of Langara Island, just across Parry Passage—were living entirely upon the Ancient Murrelets (*Synthliboramphus antiquus*), which were breeding there in thousands.

The birds were fat and inactive while incubating, both birds staying at the eyrie during both laying and incubating. In only one case out of thirteen did the male fail to show up at the first sound of the gun, and in that case it seems possible that he had been commandeered at an eyrie a couple of miles away, where, three days before, I had shot the male, leaving the female in good condition to lay again, her set having just been completed; within forty hours she could be seen at the same eyrie with a fresh mate. In only

one other case was there a lone bird, the male, keeping watch on a tree near by, while, the day being unusually hot, the female was off for exercise nearly two hours, and could sometimes be seen wheeling high in the sky.

The birds nearly always choose the very top of the cliff under the roots of a spruce-tree growing on the edge—in some cases quite easy of access, sometimes requiring a rope and some help.

Nothing was found at any of the eyries but remains of Ancient Murrelets, very rarely anything but the heads, very neatly cut off and always fresh; all other remains were cleared away carefully.

Langara Island is about twenty miles in circumference, and has a pair of Falcons at a distance of every two miles apart; the whole island is a warren of Ancient Murrelets, and there are colonies of other sea-fowl at particular points and on adjacent islets, but the Ancient Murrelets predominate, and are killed by hundreds by the Falcons and by thousands by Indians, who visit the island from May to August and destroy the birds and eggs simply for food. Something in the flavour evidently pleases both the Falcons and the Indians, for neither of them seems to make war on the other fowl.

The eggs of the Ancient Murrelet, two in number, are not hard to dig out, being only about arm's length under ground, and, strange to say, the Crows go after them under ground far enough to find all they want. The Rhinoceros Auklet (*Cerorhinca monocerata*), however, is exceedingly hard to dig out, and is almost hopeless without a small dog to direct operations and keep the right track for the nearest nest in the labyrinth of tunnels they make amongst the spruce-roots.

The Marbled Murrelets (*Brachyramphus marmoratus*) do not pack like the Ancient Murrelets, but can be seen in pairs scattered all over Dixon Entrance; their nesting-habits are still in some doubt, but much enquiry amongst Indians leads to the belief that they fly to high mountains inland and burrow there, but whether in colonies or singly has

never been discovered. They do not mix with the Ancient Murrelets' colony on Langara Island.

Two interesting sights were seen while collecting Peale's Falcons. On April 20th there were no Puffins at the island ; a few days later there was a flight of them, perhaps 100, at their yearly haunt on a rocky hillside, and, being in the neighbouring bay all day, it was interesting to see what was apparently their method of gathering. They were increasing surely, not by flocks, but by single birds. They came at intervals of a few minutes from the Pacific Ocean—one at a time, never two,—and helped to swell the number steadily increasing at the breeding-ground. The other sight was a three days' constant stream of Shearwaters in an almost unbroken line past Langara Island, all heading from Dixon Entrance and disappearing to the north-west towards the Aleutian Islands. No doubt these are the migrating hosts, returning to spend their winter in our summer seas after breeding in the Antarctic.

Peale's Falcon lays, of course, four eggs, like its congener the Duck-Hawk ; the eggs are indistinguishable from those of the latter, being red to match the hollow of rotten wood amongst the débris of trees growing at the top or on the ledges of cliffs, at any elevation above the water-line from 20 to 500 feet. One clutch was found upon a grassy slope dividing a lower cliff from an upper one, but always amongst the roots of a spruce-tree, which gives shelter to the sitting bird in rainy weather. Only one eyrie was found differently situated, and that was on a ledge sheltered by an overhanging rock ; the nest had no red rotten wood, and, interesting to note, the eggs were the palest seen.

When the complete clutch is taken, before incubation begins, the bird begins her fresh set close by the first in about ten days, but if incubation has advanced it will be more like three weeks before the new set is laid. Whether the bird would make a third attempt to raise a brood, there was not time to discover. They must be accustomed to losing their broods, for the Indians have many superstitions about them—one being that the best way to bring a west

wind is to visit an eyrie and hurl the eggs or young to the west into the sea, and for an east wind to go to the other side of the island; and this is surer than hammering a line of holes in a granite boulder in the direction from which you want the wind to come—also, if an eyrie is close by, it is quicker.

April 10 to May 1 is the usual time for eggs; after that young are very likely to be found. No young had been hatched when the island was left on May 1, 1915.

XXII.—*The assumption of Summer Plumage in Pyromelana oryx.* By A. G. BUTLER, Ph.D., F.L.S., F.Z.S., M.B.O.U.

It has been definitely asserted by Mr. Jonathan Dwight, Junr., and others, that a feather when once perfected is incapable of colour-change and that the apparent change which takes place at the assumption of the summer plumage is due to the falling off or abrasion of the tips or fringes of the feathers. That this is the case in some species is certain; but it is equally certain that in many species there is an actual change of colour in the feathers themselves, as I pointed out in a short article which I sent to 'The Ibis' in 1897, where I described changes of plumage in *Quelea quelea* and *Pyromelana franciscana* and *P. afra*.

In Stark and Selater's 'Birds of South Africa,' vol. i. p. 131, the authors confirm my statement as to the gradual change of colour in the feathers themselves at the assumption of the summer plumage in the case of *Pyromelana capensis*. They say:—"Only the feathers of the lower back, rump and flanks are entirely changed by a moult, the remaining plumage and bill becoming darker, owing to a gradual absorption of colouring matter, the change first appearing at the point of the lower mandible."

As I have elsewhere pointed out, if the plumage of birds were incapable of change by absorption of colouring after it had attained its full growth, it would be impossible for the

Touracos to regain the scarlet colouring in their feathers after it had once been washed out, and it would be equally impossible for disease or death to dull the plumage of birds, as it undoubtedly does.

In September 1906, Major Horsbrugh sent me a male example of *Pyromelana oryx* in summer plumage. This bird has regularly moulted each year at the approach of winter, and very early in the year has commenced to reassume the summer plumage. The change is extremely gradual, beginning sometimes as early as the end of January and not perfectly completed until late in May. This year the bird became ill in the first week of April and died on the night of the 5th-6th, exhibiting the transition plumage from the winter to the summer dress to perfection: the feathers of the eyebrow-streak are yellow, those of the chin and cheeks are tinted with yellow inclining to orange, the nape is rapidly assuming its orange colouring, but at the sides and back it is still suffused with the brownish winter colouring, the brown plumage of the mantle and centre of back are washed with reddish orange and the feathers of the lower back are more or less tipped to all appearance with bright golden-orange, but in this case a moult has probably taken place, although the white flank-feathers are partly tipped with the same colour; some of the buff-brownish feathers of the breast are already fringed with black.

An examination of this bird in its transition plumage should be enough to convince even the most sceptical that the assumption of the summer plumage is sometimes attained by a change of colour in the feathers, and not by a partial or complete moult of the feathers.

I still have an example of *Cyanospiza cyanea* in a somewhat similar transition plumage and, in spite of Mr. Dwight's contrary opinion, am perfectly satisfied that it also assumes its summer colouring in the same manner. If the brown plumage were moulted out in the spring and replaced by the blue and green of the summer dress, why should a bird which dies in the middle of its change exhibit a winter plumage washed over with the summer colouring? Is it conceivable

that there is a double spring moult, first into a transitional and then into a distinct summer dress? And what becomes of the moulted feathers, since the most careful search does not discover them to the owner of the bird?

I shall forward my dead bird to the Natural History Museum at South Kensington, where it will be available for examination and therefore of more use than in my own cabinet.

[The example of *Pyromelana oryx* referred to by Dr. Butler is now in the British Museum, and does not in our opinion, or that of others who have examined it, warrant the conclusion that the colour-change is brought about by the absorption of fresh-colour by the old feathers. Both it and other examples, especially one collected by Mr. Swynnerton in Rhodesia in November (reg. no. 1911.5.30.394), show undoubted signs of moult.—ED.]

XXIII.—*Field-notes on some of the Waterfowl of the Argentine Republic, Chile, and Tierra del Fuego.* By F. E. BLAAUW, C.M.Z.S., M.B.O.U.

(Plate XIV. & Text-figure 12.)

IN some previous papers I have given details of the breeding and development of some of the Waterfowl of South America from experiences gathered on birds kept by me at Gooilust. In the spring of 1911, during a trip to South America*, one of my objects was to see as much as I could of the Waterfowl of that country.

In the following notes I give the results of my observations concerning those Waterfowl in their native haunts. My route was as follows:—

From Buenos Ayres, across the Andes to Santiago, from Santiago southward, crossing and recrossing the Andes between the Lake Todos los Santos and the Nahuel Huapi Lake, from there to Puerto Montt, back northwards to Corral, by ship to Punta Arenas; from Punta Arenas to

* See 'Notes from the Leyden Museum,' vol. xxxv. 1912, pp. 1-74.

Tierra del Fuego and back; from Punta Arenas through the Smith Channel, the Chonos Archipelago, the channel to the east of Chiloe, to Concepcion, and back to Buenos Ayres.

The observations were all made during March and April 1911.

Phœnicopterus chilensis.

In a large shallow lake which I passed in the railway, travelling from Buenos Ayres to Mendoza, not far from Rufino, I saw thousands of Flamingos standing in the water. This was in the beginning of March.

On my way home two months later, passing this same lake again, it was almost dry and nearly all the birds had left it.

During the second half of April I saw five specimens in one of the Jente Grande lagoons in the north-west part of Tierra del Fuego. These birds were very wild. I was informed that they come there during the winter only.

Cygnus melanocoryphus.

I saw no specimens of this species in Chile proper nor on the Pampas as I travelled from Buenos Ayres to Santiago.

I only met with them in Tierra del Fuego on a large lagoon which I passed between Porvenir and Jente Grande. A very large number of these birds was assembled there, several hundreds, and they were so tame that I could ride to the margin of the lake without their taking wing. It was a beautiful sight.

These Swans, I was informed by Mr. Hobbs of Jente Grande, breed on the Jente Grande estate, but seldom succeed in bringing up other than small broods.

Coscoroba coscoroba.

I met with the Coscoroba Swan only twice. The first time (it was in the beginning of March) I saw half-a-dozen swimming in a shallow pool close to the railway-bank not very far from Rufino, as I travelled by rail from Buenos Ayres to Mendoza. The second time I met with these birds

was in Tierra del Fuego in the second half of April. I was riding from Porvenir to Jente Grande, on the north-western part of the island, and on my way passed near a large lagoon.

In this lagoon there were great numbers of Coscoroba Swans; they challenged me with their call of "Coscórobá" as I got near. A little later on, in what I considered to be part of the same lagoon, I saw a few more.

Unfortunately, I forgot to inquire if the Coscoroba ever breeds in Tierra del Fuego.

In 'Notes from the Leyden Museum,' vol. xxxv. note i. p. 50, pls. i. & ii., I have described and figured the newly-hatched chick of the Coscoroba, from a chick bred in Woburn Park. The chick is white, with dark grey markings on the head and upper parts. The head-markings resemble in style those of a *Dendrocygna*; those of the back closely resemble those of a chick of a Shell-Duck, but are not so heavy. The Coscoroba, to my mind, is a gigantic Tree-Duck.

Chloëphaga hybrida.

I met, for the first time, with the Antarctic Goose in Smith Channel, shortly after having left the Straits of Magellan, going north. They were standing on the water's edge at the base of mighty rocks. The beautiful white male was like a spot of snow, and was visible at a great distance. The blackish-brown female was much more difficult to see.

During the whole of my voyage through Smith Channel and its continuation, Antarctic Geese were constantly seen. They were generally noticed in pairs or in small families of five to seven, and occasionally I saw a solitary male. They were always near the water's edge and often on bare rocks projecting out of the water. They are entirely confined to the sea-shore, and I never saw them on a sandy beach. They haunt the rocks and the stones on which a peculiar edible species of seaweed grows, called "*Lutche*" by the natives, and on which they may be seen feeding when the tide is low. They probably also feed on marine animals, which they find in the same places.

In Slight Harbour, Happner Sound, in the Gulf of Peñas, I saw a solitary white gander sitting on the rocks and pebbles on the sea-shore. It seemed to be the king of a whole tribe of *Phalacrocorax albiventer*, one *P. brasiliensis*, and numerous *Larus dominicanus*, which were surrounding it.

The northern coast of the Island of Ascencion (the most northern island of the Chonos Archipelago) seems to be one of the strongholds of the Antarctic Goose. They were numerous in small families all along the water's edge, and the captain of the vessel, who had travelled along this coast for many years, told me this was always the case. In this place the birds were called "Kaïks" by the natives, whilst in the south they called them "Kaïkénes."

These Geese are said never to go inland and never to gather into large flocks like other species of Geese.

At Melinka I went ashore, and, following the coast, I had an excellent opportunity of studying the Geese, as they were very tame. The adult male is a beautiful bird. It is about the size of the Ashy-headed Goose, but stouter in build. The whole plumage is snowy white; the bill is black, and so are the glistening large eyes. The legs and feet are a light citron-yellow. The adult female has a yellowish flesh-coloured bill, a yellow ring round the eyes, and pale yellow legs. The general colour is dark brown and black finely streaked with white. The head is brown. The shoulders, back, and tail are white, and very conspicuous when the bird flies.

The young birds of the year, before they have moulted, are more or less similar to the female, but the colours are duller. The tail is white with black spots, and the bill and legs are blackish.

I think it probable that at the first moult the young male moults all his feathers except the large flight-feathers, which are retained until the second moult. The result of this is a white bird with black flight-feathers, with yellow legs and black bill. I saw several birds in this stage at Melinka.

A friendly native sold me a living bird in its first plumage,

which I brought home with great difficulty, and which proved to be a male.

From Melinka I went to the south coast of Chiloe, and on this coast, which is rocky, I saw the last of the Antarctic Geese. Farther north, on the eastern coast, the coast of Chiloe is sandy, and no more Geese were seen.

The south coast of Chiloe, therefore, seems (at least on the eastern side of the island) to be the most northern limit of their distribution.

In the Museum of Santiago in Chile, and also in the Museum of Padre Borgatello in Punta Arenas, I saw chicks in down of *C. antarctica*. They were coloured as follows:—Light silvery grey, a darkish line over the wings, a dark spot over each thigh; white eyebrow-streaks, and a white underside.

Chloëphaga inornata.

This Goose is often called the Chilean form of *Chloëphaga magellanica*. This is rather misleading, as this species of Goose is not peculiar to Chile, nor even of very common occurrence in that country, so far as my experience goes. I have been over a good part of Chile, from Santiago southwards, but I have not seen a single specimen.

Hudson saw great flocks of it in Patagonia, near the Rio Negro and Rio Colorado, and he mentions that in winter it goes as far north as fifty miles south of Buenos Ayres. I myself saw in Punta Arenas tame specimens that had been captured on the mainland, to the north of that place.

It inhabits Tierra del Fuego in countless numbers, and the first birds I saw on a sand-flat before reaching Porvenir was a great flock of these Geese.

Later on, more inland, I saw it everywhere, and it seems to be specially attracted by the fine grass, which is a result of the grazing of the sheep. It is a most ornamental feature of the landscape, and its coloration harmonizes to perfection with its surroundings.

The settlers found that very little could be done in the

way of shooting to diminish their numbers, as the birds after a few shots became so wild that they could no longer be approached; the old birds are not very much molested for the present. The nests and the young are, however, destroyed in a most disgraceful way.

The birds are residents in Tierra del Fuego, but everything about their life-history is, apparently, not known. For instance, people there told me that these birds had never been found moulting and unable to fly.

This, of course, is an error, as semi-domesticated Geese of this species moult their flight-feathers exactly like other Waterfowl (*Anseranas semipalmata* excepted, which moults its flight-feathers like an Ibis and can always fly).

This belief only makes it likely that at the critical time the birds wander away to some unknown or uninhabited part of Tierra del Fuego, or its adjacent islands, where they can moult in peace and security. This is probably the only thing that preserves the species, as the settlers would certainly destroy them in great numbers if they moulted in inhabited or accessible country.

The lagoons near Jente Grande, or some of them, are very shallow in some parts, and it was a surprising sight to see a number of these Geese quietly standing on one leg, without wetting their underside, in the midst of a large expanse of water, which, naturally, one would expect to have been much deeper.

Chloëphaga magellanica.

Amongst the countless numbers of *Chloëphaga inornata* which I saw in Tierra del Fuego, I have only seen very few white-breasted birds belonging to the allied *C. magellanica* of the Falklands. They were probably stragglers that had lost themselves amongst the flocks of *C. inornata*. I did not see single flocks, however small, of these birds alone.

The young of *C. magellanica* in their first plumage have generally slightly barred or spotted undersides. After the first moult they acquire the white underparts. The white,

as the bird gets older, inclines to extend itself. This is not the case with *C. inornata*, which is and remains striped, even in extreme old age.

Although isolated specimens of this species may occasionally wander to other places, it seems likely that it is peculiar to the Falklands and has its true habitat there, whilst everywhere else in South America, in Tierra del Fuego and its adjacent islands, and on the mainland, the usual form is *C. inornata*.

Chloëphaga poliocephala.

I was told in Tierra del Fuego that the Ashy-headed Goose is a scarce summer visitor to the island, breeding there in small numbers. In autumn it is said to sometimes associate with the flocks of *Chloëphaga rubidiceps*.

I myself did not see a single example, although I could approach the flocks of *C. rubidiceps* close enough for inspection. Nor did I see any by themselves.

On the mainland, behind Punta Arenas, it is also said to breed, and in the Museum of Padre Borgatello of that town were some specimens that had been obtained during the breeding-season in the neighbourhood.

In Chiloe this bird is said to be abundant in some seasons and to breed there. In Puerto Montt I saw a female in confinement which was said to have been obtained in Chiloe.

Chloëphaga rubidiceps.

This pretty little Goose is a very common inhabitant of Tierra del Fuego, although its numbers are not to be compared to those of *Chloëphaga inornata*.

It is a summer visitor to the island, and leaves in April to spend the winter in the north on the mainland of Patagonia. I saw large flocks near Jente Grande and Estancia Sarita, about the 11th of April, ready to leave. The birds were quite tame.

The English settlers call these Geese "Brent."

In the Museum of Padre Borgatello at Punta Arenas were several specimens from that neighbourhood, where they also breed.

Chloëphaga melanoptera.

On the way between Los Sauces and Purén in southern Chile * I met with a flock of some dozen or more of the Andean Goose.

I was riding through a plain, or plateau, at the foot of the Maritime Andes, when two pairs of large birds came flying over my head to alight in a swampy meadow, through which ran a small stream.

The birds when flying look stouter and shorter than the Magellanic Geese, on account of their shorter necks.

The two pairs of birds on alighting were greeted by a number of others of the same species, and I could notice the way they have of puffing themselves up when taking notice of each other, just as I had seen my tame birds of this species do at Gooilust.

In the same meadow were some Black-faced Ibises and also some Cayenne Lapwings.

The birds were not wild, and quietly grazed towards me.

In the Museum of Santiago de Chile there are several specimens of the Andean Goose obtained in that district in the Cordilleras.

The females resemble the males, but are smaller and a little more faintly marked.

An immature specimen resembles the adults, but the black markings are more brownish and not so clearly defined.

A chick in down, marked "26 Febr. Cordilleras de Santiago," was white, with a black line from the base of the bill over the head, the neck, and the back, including the tail; a black crossband over the wings, and, posteriorly, a black patch on each side over the thighs; a black spot over each ear.

The native name is "Pinquén."

Anas specularis.

I once met with the White-faced Duck in a wild state and saw two in confinement.

The wild birds I saw on the banks of a stream which flows

* About 38° South Latitude.

into the Lake Todos los Santos in southern Chile. There was an open space on the banks of the stream near some bamboo-bushes, and there were six birds of this species, which let me come very near, so that I could easily identify them.

Later on, on my way home, I spent a day at Concepcion in southern Chile, and there, in a kind of model garden, I found in a small enclosed piece of water two splendid males of this species. The legs and feet of these birds were of a beautiful orange-yellow *, the iris was black-brown, the bill was blue-grey with an elongated black spot on the top near the forehead, the nail was also black.

The wing-speculum of these birds was beautiful beyond description.

The native name is "Pato de los Cordilleras," which, of course, means Duck of the Mountains.

Anas cristata.

The Crested Duck with its wonderful wing-speculum was only seen by me on Tierra del Fuego, where it was quite common.

The first time I met with it was in the Bay of Porvenir. The birds were going about in pairs, and the males seemed to be a little larger than the females, and to show a little more white in the wing when flying.

The Bay of Porvenir is a sanctuary, and the birds not being molested are quite tame.

I met with these Ducks in several inland lakes and along the coast of north-western Tierra del Fuego. They were especially numerous on the sea-shore, near the place where the blood and other refuse of the sheep, which are converted into tallow in the so-called "Grasserie" of Philips Bay belonging to the Explotadores Company, runs into the sea. They, as well as thousands of Gulls, Skuas, Oyster-catchers, etc., were feeding on this refuse.

* I cannot tell the colour of the webs of the feet as they had been cut away and were wanting, but from what remained I should say they would be dusky.

Mareca sibilatrix.

I met with the Chiloe Wigeon twice in widely different places.

The first I saw were six specimens on a mountain-stream, between San Ignatio and Potrerillos, as I travelled from Mendoza to Puentes del Inca in the Andes (about 33° S. L.)*.

The second time I noticed this species was on a small pool near Estancia Sarita, in north-western Tierra del Fuego. There were four birds, and they were the only Ducks to take wing on my approach.

Spatula platalea.

I met with the Red Shoveller in a small pool beyond Estancia Sarita of the Jente Grande estate in Tierra del Fuego, and I believe this is the first time that this species has been recorded from the island.

Querquedula versicolor.

I saw specimens of this pretty Duck on two or three pools near Estancia Sarita, in north-western Tierra del Fuego.

Nettion flavirostre.

I saw flocks of the Yellow-billed Teal on the Lake Todos los Santos, in southern Chile, not far from the little Peulla Settlement, and later on I found them in the pools near Estancia Sarita, in north-western Tierra del Fuego.

Dafila spinicauda.

Flocks of the Brown Pintail were on the Lake Todos los Santos, in southern Chile, not far from the place where I saw the little Yellow-billed Teal.

On Tierra del Fuego I saw a single specimen on the bank of a small stream near Estancia Sarita, and some more in the pools near that place.

Merganetta armata.

In the Argentine Republic I saw a male of the Spur-winged Duck flying over the Mendoza River near Caléton.

* These birds, duly recorded as belonging to this species in my original notes, have been mentioned by error under the name of *Anas specularis* in 'Notes from the Leyden Museum,' vol. xxxv. note 1.

In Chile I met with eight specimens of this pretty Duck on a wild mountain-torrent which I passed along, travelling from Ensenade los Volcan on the Lake Llanquihué to the Lake Todos los Santos.

The birds were sitting on a big rock in the wildest part of the torrent. Five were old males and three were females—easily known by their rufous colour. They were sitting upright, very much like Cormorants.

When they saw me they jumped into the seething water and, although with their heads towards the fall of the water, they managed to stay almost in the same place, looking at me all the while. After a time they swam to another rock, jumped upon it, jumped off again into the water, dived, and reappeared at some distance, and in the end hid themselves behind some large stones. They did not take wing.

The third time I met with *Merganetta* was in a little mountain-stream, which flowed into the Nahuel Huapi Lake near Puerto Blest, in the eastern part of the Gobernacion del Rio Negro (Argentine Republic). It was a solitary female.

Tachyeres cinereus. (Pl. XIV.)

It is a matter of controversy amongst ornithologists whether there are one or two species of so-called Steamer Ducks, known locally as "Pato vapores."

I am sure that there are two.

The non-flying Steamer Duck, the "Sea-horse" of the old seafarers, has been known a long time, but although much has been said and written about an allied species that could fly (for instance, by Oustalet in his 'Mission scientifique du Cap Horn,' where he devotes over twenty pages to it), everything that has been said points to the fact that the actual difference between the non-flying and the allied flying species has never been clearly stated. The latter has certainly never been properly described.

What is called *Tachyeres patachonicus* is the bird aimed at, in so far as a flying bird was meant, but how that flying



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TACHYERES CINEREUS (Male).

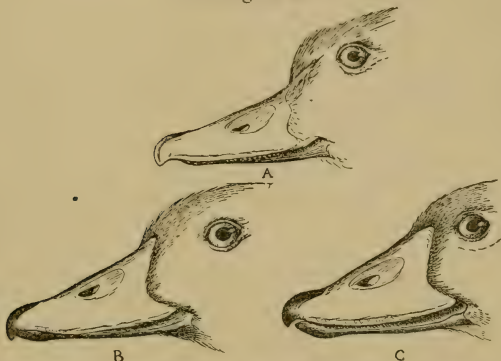
Collected at Eden Harbour, in Smith Channel,

by E. E. BLAIR, April 1911.

bird could be identified and in which ways it differed from the non-flying *Tachyeres cinereus* except by its power of flight, has never been placed on record, so far as I know.

The bird figured by Oustalet as *Micropterus* (i. e. *Tachyeres*) *patachonicus* looks like an abnormally brown or immature *Tachyeres cinereus*, of which it has the bill, whilst the short bill of the bird figured as *Tachyeres cinereus* would point to its being a male of the flying species. I am afraid that Mr. Keulemans was not very accurate when he made the drawings.

Text-figure 12.



A. Head of a young example of *Tachyeres cinereus*; B. Of a female *T. patachonicus*; C. Of a male *T. patachonicus*. All from specimens from the Falkland Islands now in the Leyden Museum.

Tachyeres cinereus, the non-flying bird, is an enormously big and heavy Duck, with very small wings, and is entirely confined to the sea.

Both sexes when adult are grey in this species, with a white underside and a white wing-speculum. The male is the lighter coloured of the two, and has a lighter head.

The bill in both sexes when adult is orange-yellow, lighter in colour in the male. It is rather *long in shape* with a *slight depression* in the top line.

In young birds the bill is dark or spotted, and so are the legs and feet.

I met with these birds nearly everywhere in the Smith Channel and its continuations. In Eden Harbour, Indian Reach, in the Smith Channel, there were great numbers together, and I counted as many as forty-two in one flock.

I got quite near to them in a small boat, and even had one shot, but there was no signs of any bird even trying to fly. When the birds got frightened they paddled away, using their wings and feet, striking the water with their wings with great strength.

They cannot lift their heavy bodies above the water, but paddle through it, making a tremendous splashing.

Near Melinka, on the most northern island of the Chonos Archipelago, I saw families of these Ducks, that is to say, pairs of old birds with their full-grown young ones. The plumage of these young birds differed from that of the adults in some of them being tinged with brownish, whilst the bills and also the legs and feet were dark or mixed with greenish.

These birds were evidently birds of the year, as they still followed their parents. They were even heavier looking than the old birds, and most certainly could not fly nor did they attempt to do so. The birds were, however, expert divers.

At Melinka the birds were not disturbed and were as tame as domestic Ducks, sitting on pieces of rock close by the shore.

I did not meet this species north of the Chonos Archipelago.

In the Museum of La Plata I saw a young chick in down of this species. It was of a brownish olive-coloured yellow, with white eyebrow-streaks.

I brought home a living specimen of this Duck that had been caught when young in the Smith Channel. It answered the description given above of the female of *Tachyeres cinereus*. At its death it was dissected in Leyden, and my

opinion as to its sex was confirmed. The skeleton is preserved in the Leyden Museum.

The young male, which was killed in my presence in Eden Harbour, I skinned myself, and found enormously powerful muscles over the skull and a very shallow keel on the sternum. The stomach contained the remains of crabs. This bird is mounted in my own collection (see Plate XIV.).

Tachyeres patachonicus.

This flying Duck is allied to *Tachyeres cinereus*. I saw it in north-western Tierra del Fuego on the sea-shore and on the lagoons inland, and it may be described as follows:—

The adult male of this species is smaller than the male of *Tachyeres cinereus*, and is similar to it in general coloration. It is of a beautiful clear bluish grey, with a white breast and belly, and a white wing-speculum. The bill is of a brilliant orange-yellow and is wider and shorter in shape than that of *Tachyeres cinereus*. The tail is elongated and carried upright when the bird swims.

The female is much smaller than the male and quite different in colour. The head is dark brown and the rest of the body, except the white underside and white wing-bars, is of a beautiful dark wine-colour, with grey centres to the feathers of the upperside and sides. The bill, which is also short and stout, is brown or black.

I saw small flocks of these birds on and near the sea-shore of Jente Grande Bay, in north-west Tierra del Fuego, and a good many pairs on the lagoons inland.

I saw the birds repeatedly fly high overhead. I saw them fly from the sea to the lakes inland and alight in my close proximity, and, standing on the sea-shore, I saw them flying towards me from the land side.

The birds were, generally, very tame, and the pairs seemed to keep together. A pair invariably consisted of a large clear grey bird with yellow bill, and a much smaller brown one with dark bill.

If I stood still on horseback at the waterside of a lake the pairs would generally swim up to me for inspection,

showing no fear. In one of the lagoons as many as six pairs came up to me, and every pair consisted of a larger clear grey bird, as described, and a smaller brown one.

Mr. Hobbs and also Mr. Aylwin of Jente Grande, who are both observers of birds, told me that these Ducks often made their nests at a considerable distance from the water.

Besides their usual flight, these birds have a way of flying over the water, just touching it or striking it with the tips of their wings; but this is quite a different way of progressing from that of *Tachyeres cinereus*, which cannot raise itself above the water.

I saw this species only in Tierra del Fuego, and did not meet with a single specimen in the Smith Channel and more to the north.

I have seen skins of this species in the British Museum and the Leyden Museum from the Falklands, and there is a splendidly mounted pair in the Museum of Buenos Ayres from Tierra del Fuego.

XXIV.—*On the Bird-life of Houtman's Abrolhos Islands, Western Australia.* By CHARLES PRICE CONIGRAVE, F.R.G.S., M.R.A.O.U.

(Plates XV.—XVIII.)

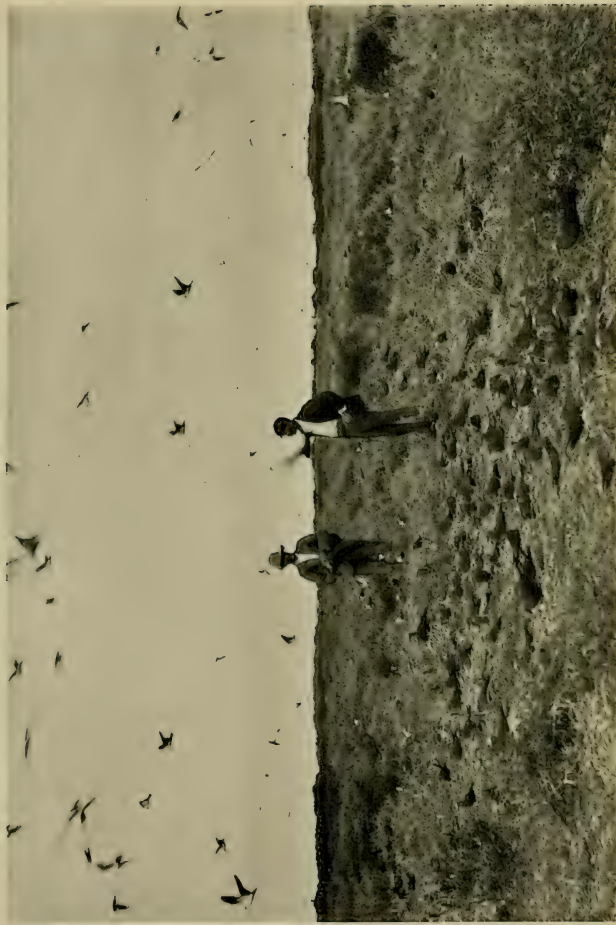
LYING some fifty miles off the mainland of Western Australia is an archipelago of small islands known as Houtman's Abrolhos which have been very intimately connected with the early history of Australia. They were first discovered by Frederic van Houtman in the year 1605, and their name, Abrolhos, is a contraction of three Portuguese words, "abri vossos olhos," meaning keep your eyes open, owing to the danger they were to the early navigators when making their way from the Cape to Java. They were the scene of the wreck of Capt. Pelsart's ship the 'Batavia' in 1629, and the mutiny of part of his crew under Jerome Cornelis, his supercargo. The largest of the islands is called after the ill-fated Dutch Captain.

The writer has been fortunate in visiting the Abrolhos on two occasions, first in 1897 and again recently, when, as a member of a scientific party, he had many opportunities of studying the interesting forms of marine life that the islands are justly famous for. At a distance of some three hundred miles to the north of the capital city, Perth, is situated the port of Geraldton, the outlet for the rich auriferous and agricultural districts that make such a valuable portion of the great State of Western Australia. Fifty miles out to sea from Geraldton we find the widely-scattered group of islands comprising the Abrolhos Archipelago. Zoologically the islands are of the utmost interest, for, being largely of coral formation, a field is there vacant for investigation and study of that marvellous organism—the coral polyp. For ages past, too, this spot has been the rendezvous of millions of sea-birds that congregate there during the summer months for the purpose of breeding. The droppings of these birds for thousands of years has resulted in a big deposit of a valuable guano, which has been the upkeep of a thriving industry for upwards of twenty years. Until the year 1902 large quantities of Abrolhos guano were shipped to the United Kingdom and foreign countries, but recent legislation has decreed that the valuable manure may now be used only within the State.

The Abrolhos Islands are the southernmost point where living corals may be seen, at any rate in the form of reefs. The whole of the archipelago is divided into three distinct groups, made up of a series of islets and submerged reefs. "Batavia's Churchyard," or as it is now called Pelsart Island, is the largest, being some seven miles in length. From the southern extremity sweeps out a majestic fringing reef, having under its protection practically the whole of the remainder of the group. Over this reef at all times may be seen the great ocean-rollers pounding against the first obstruction from African shores. The large area within the reef is of shallow depth, and here the corals in all their wealth of form and colour are on every hand.

Skippers sailing boats to the Abrolhos invariably leave Geraldton during the midnight hours in order that the dangerous reefs and shoals of the islands may be negotiated in early daylight. In our case, after a rough and tempestuous trip across, we found our craft at daybreak heading a course amongst a perfect maze of reefs and islets. The pretty mottling of the surface where the coral lumps came near to the surface was a sure guide to our skipper to keep in darker water, where the depth was greater. Away to the west stretched the fringing reef, with the never-ending breakers dashing themselves into showers of spray. Trailing like a great white ribbon against the dark sea was Pelsart Island—only at the northern end did any vegetation show, and there just a splash of green, indicating a dense mangrove thicket. The headquarters of the guano industry are at the southern end of the island, where a few corrugated iron houses stand near the beach, and a long jetty runs out into deep water. Here we landed and were at once made welcome by the Manager of the island. The guano collecting was in full swing, the manure being dug up and thrown through large screens to rid it of roots, stones, and other débris, preparatory to being run on light tramways to the jetty, from where it is taken in luggers to the larger vessels that are compelled to lie out in the offing some distance away. Only during the summer months is the island inhabited, for when the winter gales rage in all their fury, life in such a place would be wellnigh unbearable, if not quite impossible.

Early in August the immense hordes of sea-birds commence to congregate from the great southern oceans, and by the end of October all the rookeries are fully occupied, and then it is that one may see perhaps the most wonderful zoological sight in the world. Every bush is occupied by a bird or its nest, and not alone the low scrub is tenanted. The ground also is covered with birds. The commonest species to be found nesting are the Noddy Terns (*Anous stolidus*) and the Sooty Terns (*Sterna fuliginosa*), although something like forty species frequent the Abrolhos during the summer months.



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NODDY TERNS (*Anous stolidus*)
On Pelsart I., Houtman's Abrolhos.



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NODDY TERNS (*Anous stolidus*)

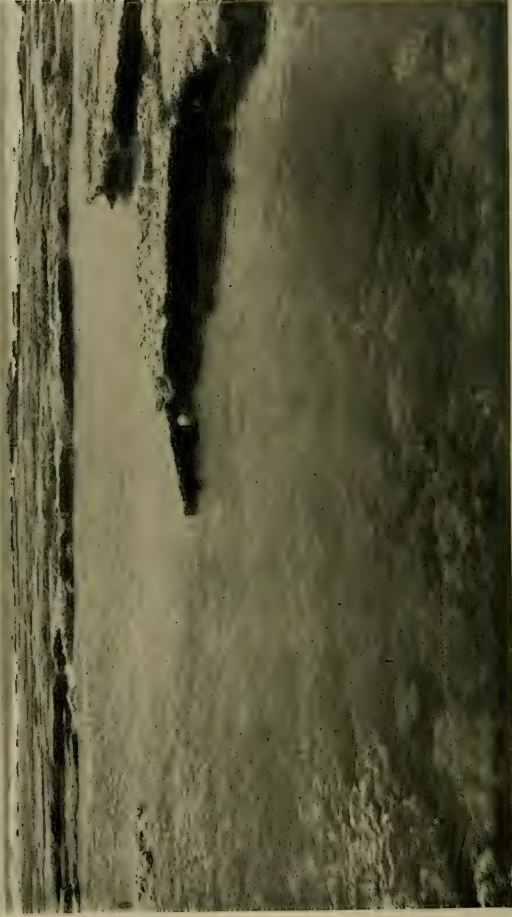
Nesting on Pelsart I., Houtman's Abrolhos.



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LESSER NODDY TERN (*Micranous tenuirostris*)

Among the mangroves on Pelsart I., Houtman's Abrolhos.



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THE FRINGING REEF OF PELSART I., HOUTMAN'S ABROLHOS.
AT LOW TIDE.

Close to the Pelsart settlement is the largest rookery. Thousands upon thousands of birds are constantly wheeling overhead, and the resulting noise from the harsh screaming becomes almost deafening. We make our way through the low scrub, but beyond a little scuttling on our first appearance, the birds exhibit no alarm. It is only with great difficulty that we avoid stepping on to a bird or its nest, so closely do they sit. Many and many an acre is occupied in this way, and then, besides, the Mutton-birds (*Puffinus chlororhynchus*) burrow into the guano, and so in some places there are three tiers of birds, so to speak—in the bushes, on the ground, and in the subterranean hollows as well. Looking seawards over the partly submerged reefs, we see great flocks of birds foraging for their food supply, and the fact comes forcibly home to one that very marvellous indeed is the supply of Nature. Millions upon millions of birds are here daily getting their sustenance provided for them by a great Creator.

Towards the northern end of Pelsart Island are several small lagoons, prettily enclosed by wide-sprawling mangroves. These were occupied by another species, the Lesser Noddy Tern (*Micranous tenuirostris*), very similar in appearance to the Noddy, but smaller, and more fussy and garrulous. The sandy foreshore within the protection of the large fringing-reef gives sanctuary for many of the wading birds—in fact, every nook and corner of the island is occupied by birds.

A few miles away lies Middle Island. Here we wandered over the reef and studied the corals and all the wonderful growths of a sub-tropical sea. Immense sea-urchins with spines a foot in length, the Bêche-de-mer or Sea-slug, the gaily-coloured fishes, and multitudes of smaller objects were everywhere in plenty.

With reluctance it was that, after a few days' stay at this island, we had to set sail for the northward, for, tied by time, it becomes necessary for a complete cruise through the archipelago to move apace. At this period of the year (November) the strong gales, "southerly busters," are very prevalent. Then it is wise to remain in shelter, for no

sailing-boat could well make progress in such a sea as is lashed up; at any rate, such an experience would be decidedly uncomfortable.

A few lovely days, with hardly a cloud in the sky, will pass, and then, heralded by a gusty wind, will burst the gale, which, howling and roaring as it does, makes one feel very contented when the lugger is safely anchored on the lee of an island.

Rat Island, twenty miles to the north of the first-named, is another great nesting-place for the birds, and this was our objective on leaving the guano station. By midday we were rolling in a big sea alongside Wooded Island, a patch of green and white outlined by great white combers dashing on to the fringing reefs. Running alongside a perpendicular reef in perfect shelter, we went ashore and examined the rookery of the Lesser Noddies. Here some ten acres of mangrove trees were thickly occupied by these pretty little brown birds. Every branch supported dozens of nests, roughly constructed of seaweed. As we go amongst the trees great is the clatter, for the Lesser Noddies believe not in being disturbed, at any rate without objecting. Little downy objects here and there are recognised as baby terns, their parents hovering closely to guard their offspring if possible from danger. There is, however, no time for close study when the southerly gale is brewing; so after a hurried visit, during which the photographers are hard at work, we wander over the banks of dead and bleached coral back to the lugger. Rat Island lies four miles away to the north, and, with half a gale piping behind, we wallow hither in an angry sea. Once inside the line of reef the water is calmer, and by late afternoon we are comfortably ashore. This island was the home of a number of Italian fishermen, who, although our tongues were foreign, gave us a most hospitable welcome. That evening we gathered in their little stone hut, and round a blazing fire passed time pleasantly in broken conversation with these hardy toilers of the sea. During our stay we got quite a picturesque glimpse into the fishing industry. At daybreak a fleet of

small boats would depart for the various Schnapper grounds, where during the day the men would toil for the harvest of the sea. The Schnapper (*Pagrus unicolor*) is a common Australian edible fish. As afternoon wore on to evening, back through the reefs the men would come, each with his respective catch. The fish were then cleaned and placed in ice, aboard a large lugger, which made weekly trips to Geraldton with several tons of fish. We were prisoners on Rat Island for several days, owing to the gale; but the time passed pleasantly enough in the wonderfully interesting work that we were able to carry out amongst the marine fauna. At last, after saying farewell to our lonely fisherfolk, we sailed north again for the Wallaby Islands, distant some thirty miles.

Quite different in character from the rest of the islands are the last-named, for here, typical mainland forms, such as the Wallaby and various snakes and lizards, occur in plenty. Heavily scrubbed for the most part, the Wallaby Islands are an ideal hunting-ground, as numbers of quail and pigeon are common. We camped ashore at the East Wallaby Island, and pleasant indeed it was after an arduous day's tramp through the thick scrub to return to the little camp beside the great coral-reef. Looking seawards could be seen the fringing barrier, its length marked by the line of white where the ocean rollers pounded unceasingly against the reef, showing against the western horizon.

A cluster of dark islets afforded an ideal anchorage for the lugger, and as evening shadows lengthened, the anglers of the party here obtained sport to their heart's content. The memory of those islands is a very pleasant one, for in such a locality one seemed to get very close indeed to Nature and her ways, and at the back of all was the knowledge that a romantic and most interesting history shrouded the lonely islands.

Perhaps no spot in Australia is of greater interest, zoologically speaking, than these islands, which together make up such a formidable and dangerous outpost to the littoral of Western Australia.

XXV.—*Obituary.*

WELLS WOODBRIDGE COOKE.

We regret to announce the death of Prof. W. W. Cooke, which took place on the 30th of March last at Washington, from pneumonia after an eight-days' illness. Prof. Cooke is well known to many of us for his writings on the subject of the migration of North American birds, on which he was certainly the leading authority. He was born in Massachusetts, January 25, 1858. His family removed to Wisconsin, where he was educated at the Ripon College. Later he became connected with the Indian service in Minnesota and Indian Territory. Between 1886 and 1901 he was Professor of Agriculture successively in the University of Vermont and at the Agricultural College at Fort Collins in Colorado; in the latter year he became an Expert Assistant with the Biological Survey at Washington. Here he was in charge of the voluminous records on migration and distribution, and ever since 1881 he has poured out a stream of papers almost all devoted to this subject. These were published in the official records of the Biological Survey and the U.S. Department of Agriculture, and also in the 'Auk' and 'Condor.' He also prepared for the College at Fort Collins a work on the Birds of Colorado, which with two appendices appeared in the years 1897-1900. Prof. Cooke's work was distinguished for its accuracy, and from the very large number of records which he had accumulated he was able to deduce many interesting facts in regard to migration routes and other problems, and his death is a great loss to American ornithologists.

GUY L'ESTRANGE EWEN.

With regret we have to announce the death of Mr. Ewen, which took place at Windsor on the 25th of April, as a result of a severe nervous breakdown.

Guy L'Estrange Ewen was born on the 26th of November, 1860, at York, and was a son of the late Major and Mrs. Ewen. He was educated at Harrow. For about ten

years from 1883 he was an Extra Queen's Foreign Service Messenger, and resided at Darmstadt. Subsequently he became a regular Foreign Service Messenger, which post he held till 1913, when he was forced to retire owing to bad health. He received the coronation medals of both King Edward VII. and George V. for his services.

Though he never published anything, he was always interested in birds and their eggs, and in his younger days he amassed a considerable collection of eggs, especially of the Birds of Prey. He was elected a Member of the Union in 1905.

HERBERT HASTINGS HARINGTON.

It is with deep regret that we have to record the death on the battle-field of another Member of the Union. Col. Harington, well-known to many of us both personally and from his excellent work on Indian birds, was killed in action in Mesopotamia on the 8th of March last.

Lieut.-Colonel Herbert Hastings Harington was born at Lucknow on the 16th of January, 1868, the son of Mr. Herbert Harington, of the Oudh Commission. Educated at Malvern, he entered the Militia, and in 1888 was gazetted a subaltern in the Welsh Regiment. Two years later he was appointed to the Indian Staff Corps, and joined the 92nd Punjabis, with which regiment he served for over twenty years in Burma and in India; also for five years he was attached to the Burmese Police.

In December 1914 he was promoted Lieut.-Colonel, and in February 1916 was gazetted to the command of the 62nd Punjabis, and it was whilst leading this Regiment into action in Mesopotamia that he was killed on the 8th of March.

In 1909 Colonel Harington married Dorothy, the youngest daughter of the Hon. Walter Pepys, by whom he had a son and two daughters.

Colonel Harington had always been a keen lover of nature and natural history generally, but it was not until he went to Burma that he really took up Ornithology seriously. His first articles were written for the *Rangoon*

Gazette, and soon attracted notice on account of the careful and accurate observation they displayed. These articles he reproduced in book form in 1909, adding a valuable table showing the distribution of Burmese birds*. He also contributed articles from time to time to 'The Ibis,' the Journal of the Bombay Natural History Society, and other periodicals; the most important of these was his review of the Timeliidæ, which appeared in the Bombay Journal during 1914-15.

Colonel Harington was the discoverer of a number of new forms, and several birds have been named after him by various ornithologists in recognition of the good work he did. Amongst these may be mentioned *Polionetta haringtoni* Oates; *Oreicola f. haringtoni* Hartert; *Pomatorhinus e. haringtoni* and *Garrulus haringtoni* Sharpe. He was elected a Member of the Union in 1904.

We regret to announce the death of Lt.-Col. E. A. Butler on May 16 last. We hope to give a notice of his life and work in the October number.

XXVI.—Notices of recent Ornithological Publications.

Bangs's recent papers.

[The Bahama Swallow in Cuba. By Outram Bangs. Auk, xxxi. 1914, p. 401.

The Bermuda Crow. Id. *ibid.* xxxii. 1915, pp. 229-230.

Cabot's types of Yucatan birds. Id. *ibid.* xxxii. 1915, pp. 167-170.

Notes on dichromatic Herons and Hawks. Id. *ibid.* xxxii. 1915, pp. 481-484.

A Collection of Birds from the Cayman Islands. Id. Bull. Mus. Comp. Zool. Cambridge, Mass., lx. 1916, pp. 303-320.

Three new subspecies of birds from Eastern Mexico and Yucatan. Id. Proc. Biol. Soc. Washington, xxviii. 1915, pp. 125-126.

The American Forms of *Gallinula chloropus* (Linn.). Id. Proc. New England Zool. Cl. v. 1915, pp. 93-99.]

In the first of this long list of papers which Mr. Bangs has recently sent, he informs us that he has received two

* The Birds of Burma. By H. H. Harington, Major, Indian Army, M.B.O.U., F.Z.S. Rangoon, 1909. 134 pp. 8vo.

examples of *Callichelidon cyaneo-viridis* (Bryant) from Nipe Bay in north-west Cuba, killed by Mr. V. Cameron Forbes in March. This species was previously supposed to be confined to the Bahamas. In the second paper he confirms Mr. J. N. Kennedy's belief that the Bermuda Crow is the common eastern North-American species, *Corvus b. brachyrhynchos*, which is said to have been introduced into those islands about 1876.

It is always of interest to know where the original types, especially of species described by older authors, are to be found. Those of Dr. Samuel Cabot, Jr., who in the "forties" of last century travelled in Yucatan and amassed a considerable collection of birds, which are described in an appendix to 'Incidents of Travel in Yucatan,' by John L. Stephens (London, 1843), were, after Dr. Cabot's death, presented to the Boston Society of Natural History, and have now passed into the possession of the Museum of Comparative Zoology at Cambridge, Mass. A list of such of these types that are still identifiable is given in Mr. Bangs's third paper.

The fourth paper has already been referred to in our pages (*antea*, p. 76); the following one deals with the birds of the Cayman Islands, and discusses a collection made in 1911 by Mr. W. W. Brown, Jr., between the months of April and May. Some interesting remarks are made by Mr. Bangs on the sources whence the bird-life peculiar to the islands has been derived, and a new subspecies (*Amazona leucocephala hesternae*) is proposed for the Parrot inhabiting Little Cayman and Cayman Brac, which is believed to be distinct from that (*A. l. caymanensis*) inhabiting Grand Cayman. In view of the remarks of Mr. English (*Ibis*, *antea*, p. 17) on the variability of the Cayman Parrot, this may perhaps be hardly justifiable.

The last two papers on the list are short: one contains descriptions of *Tityra semifasciata deses* from Yucatan, *Turdus migratorius phillipsi* from Vera Cruz, and *Cyanocopsa parellina beneplacita* from Tamaulipas, all new subspecies from Mexico. The last paper reviews the Moorhens

of the American Continent, which Mr. Bangs considers only subspecifically distinct from the European *Gallinula chloropus*. In addition to *G. c. galeata*, now confined to southern Brazil and northern Argentina, Mr. Bangs recognizes *G. c. cerceris* Bangs from the Lesser Antilles, *G. c. garmani* Allen from the Peruvian and Bolivian Andes, *G. c. pauwilla* from western Colombia, and *G. c. cachinnans* from eastern and central North America. The last two are here described for the first time, and the last-named is the form which has hitherto been referred to *G. galeata* by all previous writers.

Brasil on New Caledonian Birds.

[Notes sur une collection d'oiseaux de la Nouvelle Calédonie et de Lifou. Rev. Franç. Orn. vii. 1916, pp. 193-204, 219-223.]

In this paper M. Brasil gives an account of two collections of Pacific birds made many years ago, between 1865 and 1869, by Naval-Surgeon E. Deplanche and Commander H. Jouan in the island of New Caledonia and the neighbouring island of Lifou, one of the Loyalty group.

These collections, which are now in the Museum at Caen, have never yet been reported on, much to the regret of M. Brasil, who finds among them many forms which have been described as new by other authors in collections made since that date.

Out of the 68 species here enumerated, however, he finds five worthy of distinction as new subspecies, namely:—*Chalcophaps chrysochlora disjuncta*, *Haliastur sphenurus johannæ*, *Pandion haliaëtus microhaliaëtus*, *Tyto alba lifuensis*, *Sauropatis sancta canacorum*.

Brooks on Siberian and Alaskan Birds.

[Notes on Birds from East Siberia and Arctic Alaska. By W. Sprague Brooks. Bull. Mus. Comp. Zool. Cambridge, Mass., lix. 1915, pp. 361-413.]

In the spring of 1913 Messrs. W. Sprague Brooks and Joseph Dixon accompanied a hunting expedition organized by some graduates of Harvard University in northern

waters. Leaving Seattle in the spring they cruized along the Alaska coast, and thence to Copper Island and Kamchatka until the end of July; then crossing Behring Straits they sailed along the northern Alaskan coast, and finally wintered near the Alaska-Canadian boundary, and they did not again meet civilization till August 1914. During that time they made large collections of birds at various localities, and the present paper contains their observations and field-notes. A good many of the rarer Waders were found nesting, such as *Ereunetes pusillus*, *Pisobia pectoralis* and *P. bairdi* in northern Alaska, and *P. minuta ruficollis* in Siberia.

The following new forms are described:—*Larus thayeri*, Ellesmere Land and northern Alaska; *Histrionicus histrionicus pacificus*, Kamchatka; *Oidemia deglandi dixonii*, Arctic Alaska; *Leucosticte griseonucha maxima*, Copper Is.; and *Nannus hiemalis semidiensis*, Semidi Is., Alaska.

Chandler on the Structure of Feathers.

[A Study of the Structure of Feathers with reference to their taxonomic significance, by Asa C. Chandler. Univ. California Publ. Zool., Berkeley, vol. xiii. 1916, pp. 243-446; 25 pls., 7 text-figs.]

This is an important and lengthy memoir of over two hundred pages in which the structure of feathers in all their various modifications are reviewed throughout the various orders and families of birds. Previous works on the subject by such authors as Gadow, Pycraft, Wray, and others are fully utilized, and a long bibliography is given. An introduction and a general account of the morphology of feathers occupies some forty-five pages, and this is followed by the systematic review. In each subordinal group a type is selected and the structure of the feathers described at some length, and a summary of the most important characters is given.

In the concluding pages the value in taxonomy of the principal modifications of feathers as they appear to the author is discussed, and some suggestions as to the

relations of certain types are considered as deduced from the study of their feather-structure. For instance, Dr. Chandler believes that *Cursorius* is more fittingly placed with the Ardeæ than with the Limicolæ; that the Phaëthontidæ are more closely related to the Laridæ than to the other Steganopodes; that the Galbulidæ show evidence of not belonging to the Pici. All these suggestions, as is certainly pointed out by Dr. Chandler, are based on the study of feather-structure alone and must be taken into consideration with other structural characters; but the whole paper is a most suggestive one, and should be carefully studied by all those who are interested in the morphology of the epidermal structures of birds.

Chapin on the Pennant-winged Nightjar.

[The Pennant-winged Nightjar of Africa and its Migration. By James P. Chapin. Bull. Amer. Mus. Nat. Hist. New York, xxxv, 1916, pp. 73-81, map.]

Mr. Chapin, who has been collecting for many years past in the Belgian Congo, has made some interesting observations on the Pennant-winged Nightjar (*Cosmetornis reaxillarius*), in which the inner primaries are enormously elongated and reach two and a half times the whole length of the bird itself. This extraordinary modification renders the bird very conspicuous, and once seen it can never be forgotten or mistaken.

Mr. Chapin makes it clear from his own records, as well as those of other observers, that this bird is found north of the great equatorial forest of west and central Africa only between March and July, and it is not known to breed during that period. Between September and January it occurs to the south of the equatorial forest, and has been recorded in various localities during those months in Angola, Nyasaland, and Rhodesia.

Mr. Chapin, when in the Ituri forest, saw the birds only for a short time in February and March, and again in July and August, and believes that they were then on their migration northwards to their "winter quarters" and

southward to their breeding range. These observations are exceedingly valuable and open up quite new ideas in regard to the migration of tropical and subtropical birds, though it has long been known that certain south African species, such as the Larger Stripe-breasted Swallow (*Hirundo cuculata*), the South African Cuckoos (*Cuculus gularis* and *C. solitarius*), and several others, all breed in South Africa between September and March, and disappear presumably to northern central Africa from April to August.

Chapin on new African Birds.

[Four new Birds from the Belgian Congo. By James P. Chapin. Bull. Amer. Mus. N. H. New York, xxxv. 1916, pp. 23-29, 4 figs.]

The species described are *Stilbopsar leucothorax* from the Ituri district, which is figured in black and white; *Paludipasser uelensis* from the Upper Uele district, a second species of the curious little weaver-bird the first of which was described by Mr. Neave from Lake Bangweolo; *Malimbus flavipes* from the Ituri district; and *Bradypterus carpalis* from the Upper Uelle district. In the case of the last three, outline figures are given of the heads and feet, and in the case of the last-named of the wing and tail as well.

Chubb on the Birds of British Guiana.

[The Birds of British Guiana, based on the Collection of Frederick Vavasour McConnell. By Charles Chubb, F.Z.S., M.B.O.U., with a preface by Mrs. F. V. McConnell. Vol. i. pp. liv+528; 10 col. pls., map, and 95 text-figs. London (Quaritch), 1916. 8vo.]

The late Mr. McConnell (see Ibis, 1914, p. 322) spent a good many years in British Guiana and travelled extensively in the country, making two excursions to Mount Roraima. He was deeply interested in ornithology and had amassed large collections of birds of British Guiana.

At the time of his death he was engaged in making a catalogue of his collection, in which task he was assisted by Mr. Chubb.

Since his death in 1914, wishing, in memory of her husband, to have some record of his work, Mrs. McConnell

decided to ask Mr. Chubb to prepare a complete descriptive catalogue of the birds of British Guiana, based chiefly on the McConnell collections, but also making use of the material in the British Museum and elsewhere.

The present volume is the result. It contains the account of the non-passerine portion of the Guiana Avifauna, and there can be no doubt that field-naturalists as well as students will find it a most valuable work. It is arranged somewhat on the lines of Blanford's Birds in the "Fauna of India" series, and the account of each species contains a short summary of all that is known about it. There are a number of figures in the text illustrating structural generic characters, and also keys to help the student to identify any of the birds.

Three new subspecies are described in the present volume for the first time; the types are in the McConnell collection. These are *Ortygops notata duncani*, *Creciscus melanophæus macconnelli*, and *Ciccaba superciliaris macconnelli*.

As has been already stated Mr. McConnell made two expeditions to Roraima, the mysterious flat-topped mountain on the borders of British Guiana and Brazil. A journal of the first journey in 1894 occupies the first thirty-four pages of the present work and is illustrated with a number of photographs of scenery and Indians. The journal of the second journey in 1898 has unfortunately disappeared, and the little we know about it is from a few lines of introduction to the account of the collections made, published in the "Transactions of the Linnean Society" (Zoology (2) viii. p. 51, 1900). The journal of the first expedition, however, is full of interest and gives us a vivid picture of the difficulties and dangers of travel in the forests and on the rivers of British Guiana.

We shall look forward with great interest to the completion of this work and would offer our congratulations to Mrs. McConnell and to Mr. Chubb on the enduring monument they have raised to the memory of Mr. McConnell.

Despott on Maltese Birds.

[A List of the Birds of Malta. Compiled for the University Museum of Natural History by Gius. Despott. Pp. 1-39. Malta (Govt. Printing Office), 1915. 8vo.]

The study of the birds of Malta has been rather neglected of late years. In the early days of the B. O. U., Mr. Charles C. Wright published in 'The Ibis' for 1864 his catalogue, and Blasius gave a complete list in 'Ornis' for 1894, containing the names of 288 species. Mr. Despott, who is Curator of the Museum at Valetta, has now given us a list of 340 species recorded from the island. Of these we believe only some dozen of the land-birds breed regularly on the islands, the others are all migrants only, and it seems that Malta would be an extremely good place at which to carry on a serious study of migration.

The present list gives the English, Italian, and Maltese names, and a short note on the status. The nomenclature seems a little antiquated, but this can easily be remedied, as we understand that Mr. Despott, who has recently been elected a member of our Union, is preparing a more detailed account of the birds of the Maltese Islands.

Grinnell on Museum Methods.

[Methods of caring for study skins of Birds. By Joseph Grinnell. Proc. Amer. Assoc. Museums, ix. 1915, pp. 106-111.]

In this short address Mr. Grinnell gives us of his experience his methods for labelling, cataloguing, and storing study collections of bird-skins. He does not give very precise details as to the cabinets or store-boxes in use in his Museum at Berkeley in California, but we gather they are very similar to those in use in the Museum at Cambridge, Mass., where large wooden cases lined with zinc and with air-tight doors are used. The birds are stored on light trays with pulp-board bases, which slide in and out of the cases. This is a very different system from the one in use in the Natural History Museum, and has a great many advantages over the heavy and expensive cabinets generally used in this country.

Hartert's recent papers.

[Notes on Pigeons. By Ernst Hartert, Ph.D. Novit. Zool. Tring, xxiii. 1916, pp. 77-88.]

Notes on *Glareola*. Id. *ibid.* pp. 89-91.

Concerning the occurrence of *Erolia lairdii* in South-west Africa. Id. *ibid.* p. 91.

What is the correct name of the "Long-toed Stint"? Id. *ibid.* pp. 92-93.

On the forms of *Burhinus oedicnemus*. Id. *ibid.* p. 93.

On the birds figured in the Atlas to Krusenstern's Voyage round the world. Id. *ibid.* pp. 94-95.

Errors in quotations. Id. *ibid.* pp. 112-114.]

In the last number of the Tring Journal Dr. Hartert publishes seven short notes on various subjects. We will try briefly to summarize their contents and conclusions.

The truly wild Turtle-Dove of India has usually been known as *Streptopelia* (formerly *Turtur*) *risoria*. The name was given by Linnæus to the domesticated bird which he believed was originally derived from India. Dr. Hartert considers that our domesticated race is derived from *S. roseo-grisea* of north-eastern Africa, and that the Indian bird must be called by the barbarous term *S. decaocto* Frivaldsky. Another note deals with the various forms of the Laughing-Dove, *Streptopelia senegalensis*, of which he recognises six: *S. s. senegalensis*, Senegambia to the Cape and to Palestine; *S. s. socotræ*, Island of Socotra; *S. s. phænicophila* subsp. n., from Morocco to Tunis south of the Atlas range; *S. s. ægyptiaca*, Egypt; *S. s. cambayensis*, India; *S. s. ermanni*, Turkestan to Muscat. For the Spotted Dove of Yunnan and the Snow-Pigeon of western China Dr. Hartert proposes the new subspecific names, *Streptopelia chinensis vacillans* and *Columba leuconota gradaria* respectively. The Laurel Pigeon of the Canaries, generally known as *Columba larvivora*, is renamed *C. junoniæ*, as the former name is shown to be a synonym of *C. trocaz* of Madeira.

In the second note on the list Dr. Hartert dismisses the genera *Galactochrysea* and *Subglareola* (the latter recently proposed by Mathews) as unnecessary; he also shows that the Pratincole of southern Europe does not migrate south

of the Sahara, and that the Pratincoles of Africa form distinct races and breed there. Of these he recognises two races—*Glareola pratincola limbata*, Nubia to Angola, and *G. p. fülliborni*, East Africa and Natal. The Pratincole of Asia migrating to Australia, hitherto known as *G. p. orientalis*, Dr. Hartert regards as a distinct species and calls it *G. maldivarum* Forst.

The third note deals with the occurrence of Baird's Sandpiper in South-west Africa. A single example obtained by Andersson at Walvisch Bay on October 23, 1863, passed from the Seebohm collection into that of the Museum of St. Petersburg and is presumably still there. It never went to the British Museum with the rest of the Seebohm collection. This example is the only one ever recorded from Africa.

In the fourth note Dr. Hartert states his reasons for believing that the name of the Long-toed Stint should be *Tringa* (or *Erolia*) *subminuta* Middendorff rather than *Tringa damacensis*, the name used by Sharpe in the Catalogue and by the B. O. U. Check-list.

The fifth note distinguishes the Stone-Plover of Central Asia and south and east Persia as *Burhinus uedicnemus astutus* subsp. n.

Though an Atlas of Plates illustrating the spoils of Capt. von Krusenstern's voyage round the world appeared in 1814 no text was published and the Atlas remains a very rare work. Birds are figured on eight of the plates, and several of the figures formed the basis for descriptions by Vieillot in the Nouv. Dict. d'Hist. Nat. In the sixth paper on the list Dr. Hartert has endeavoured to identify these figures.

The final note gives a list of errors in quotations in the synonymy of the 24th volume of the 'Catalogue of Birds' by Sharpe, and is a warning to writers to verify their references before copying them down even from such well-known works as the 'Catalogue of Birds' or Reichenow's 'Vögel Afrikas.'

Miss Kellogg and Mr. Grinnell on Birds from northern California.

[Report upon Mammals and Birds found in portions of Trinity, Siskiyou, and Shasta Counties, California. By Louise Kellogg.

An analysis of the Vertebrate Fauna of the Trinity Region of northern California. By Joseph Grinnell. Univ. California Publ. Zool., Berkeley, xii. 1916, pp. 335-410. 21 photos.]

These two articles contain an account of collections of Mammals and Birds made by Miss Annie Alexander and Miss Kellogg in the mountainous region on the northern border of California, which does not appear to have been very thoroughly worked previously. An annotated list of the birds collected is given, and in the second paper Mr. Grinnell draws some conclusions as to the relations of the fauna of this region, which lies between the humid coast-lands and the drier country of the Sierra Nevada. On the whole he finds its relations are chiefly with the faunal region of the Sierra Nevada.

Mathews on Australian Birds.

[The Birds of Australia. By Gregory M. Mathews. Vol. v. pt. 2, pp. 153-248, pls. 245-254. London (Witherby), Febr. 1916. 4to.]

In this part the author continues the account of the Raptorial birds of the country. A considerable space is devoted to the full discussion of the genus *Falco*, its relation to other allied genera, its division into subgenera, and the types of the several divisions. From this important and interesting dissertation we learn that Mr. Mathews admits two Australian species into *Falco* proper, viz., *F. longipennis* (= *F. lunulatus* Lath. nec Daudin) and *F. hypoleucus*. The views of authors such as Kaup, Sharpe, Gurney, and so forth are carefully debated, and compared with the opinions of the Committees which produced the B. O. U. and A. O. U. Lists.

As regards the author's own predilections, he continues to propound *F. subbuteo* as the type of *Falco*; while he accepts *Rhynchodon* for the Peregrine alliance, and also utilizes *Hierofalco*, *Tinnunculus*, *Rhynchofalco*, and *Cerchneis*. In

so doing he lays considerable stress upon the value of coloration as a factor in generic determination.

Among the other genera *Haliastur indus* is stated to have four recognisable subspecies; but these are connected by various intermediates, and the species is consequently left undivided in the absence of more precise information. It is shown that "*girrenera*" is a synonym of "*pondicerianus*" and cannot be used for the Australian bird more properly called *leucosternus*. *Haliastur* lies between the Sea-Eagles and the Kites, while it is noticeable as having the mewing cry of the latter. A smaller and lighter form of *Haliastur sphenurus* is made a new subspecies "*sarrasini*."

One new genus is proposed in this part, *Neobaza* with type *N. madagascariensis*; *Baza* is restricted to *B. lophotes*; *Aviceda* and *Lophastur* are accepted as valid genera.

Several pages are required to elucidate the confusion concerning the Latin names of the two Australian *Elani*, with the result that *notatus* of Gould takes the place of *axillaris*, and *scriptus* stands as aforetime.

With respect to the rejection of Gmelin's *korschun* for *Milvus migrans*, Mr. Mathews recalls the fact that *Milvus* was once used for both Harriers and Kites, to which the reviewer may add that in Norfolk the male Harrier is a "Kite," and in Wales he has heard the Buzzard called by the same name. The Australian or Allied Kite is but a subspecies of *M. migrans*.

For several other subspecies formerly proposed, but cancelled after further consideration, readers must consult the pages of the work.

Murphy on South American Cormorants.

[Notes on American Subantarctic Cormorants. By Robert Cushman Murphy. Bull. Amer. Mus. N. H. New York, xxxv. 1916, pp. 31-48. 13 photos.]

This paper is chiefly concerned with the identification and relationships of the Cormorant of South Georgia, the habits of which the author studied in 1912-13 when cruising

around that island. He also collected seventeen specimens, which form the basis of this paper and which are now in the American Museum.

Mr. Murphy finds that *Phalacrocorax georgianus* is, on the whole, more closely allied to *P. albiventris* than to *P. atriceps*, with which it has hitherto been associated as a subspecies, and he gives us a table of measurements and of other characters of the three forms to prove his case.

In the second half of the paper field-notes and descriptions of the nesting-habits and eggs are given, and these are illustrated with a number of excellent photographs taken at the breeding-place—a small precipitous islet lying near the south shore of the Bay of Isles in South Georgia, where he found this Cormorant nesting in considerable numbers in December.

Noble on a new Dove.

[A new Dove from St. Croix, Danish West Indies. By G. K. Noble. Proc. New England Zool. Cl. v. 1915, pp. 101-102.]

Mr. Noble distinguishes the Zenaida Dove of St. Croix, and presumably that of the other islands of the Lesser Antilles, under the name of *Zenaida zenaida lucida* as distinct from *Z. z. zenaida* of the Greater Antilles and the Bahamas.

Richardson's Life of Tegetmeier.

[A veteran Naturalist, being the life and work of W. B. Tegetmeier. By E. W. Richardson, with an Introduction by the late Sir Walter Gilbey, Bart. Pp. xxxiv+232; many portraits and illustr. London (Witherby), 1916. 8vo.]

Many of us must remember the subject of this biography, a little old man with keen and sharply-cut features who frequently attended the dinners of the B. O. C. in the earlier days up to 1905, and who generally had something interesting to communicate.

Born in 1816, and living a busy and active life till within a year or two of his death in 1912 at the age of ninety-six, he was a spectator of many changes and had many interesting experiences. Brought up for a medical

career he never fully qualified, though he was apprenticed at the age of fifteen to his father, himself a medical man practising in Great Ryder Street, St. James's. Young Tegetmeier soon broke away from medicine, however, and became a journalist and writer on Natural History subjects. His first published work, "First lines of Botany," appeared in 1849. During subsequent years he published many works on Poultry, Pigeons and Pheasants and their management in health and disease. In the meantime he became manager of the Poultry and Pigeon department of the 'Field' Newspaper, a position which he held for over forty years, only retiring in 1907. He also contributed the leaders to the 'Queen' for nearly twenty-five years.

Tegetmeier was a fearless critic and prodigal of his expression of hatred for wrong-doing or injustice. He was always ready for a fight when occasion arose, but he does not seem to have been any the less popular on that account at any rate with his colleagues in the 'Field' office, where he was always known as "Teggy the Fighter."

The present biography is written by his son-in-law, and gives one a very pleasant but rather rambling account of the old naturalist and of his various interests. The author apologises for his want of knowledge of ornithology and of the subjects which chiefly occupied Mr. Tegetmeier during his long life, and in one or two passages this is noticeable ; but on the whole the work is very well done and will give pleasure to his many admirers.

The introduction is written by the late Sir Walter Gilbey, with whom Tegetmeier was on terms of considerable intimacy. He, like Tegetmeier, believed that the most satisfactory method of treating game and poultry and all domesticated stock was to allow the animals or birds to lead, as far as possible, a life that conforms to natural conditions, and these principles were as far as possible carried out at Elsenham.

Tegetmeier's service to the poultry interest is impossible to over-estimate. He was for a great part of his life a judge at poultry shows, and when he commenced this work

in the "fifties" the moral standard of exhibitions was very different from what it is now. So-called "improving" birds was rife, and the honest exhibitor had no chance. Tegetmeier set his face against all such practices, and after many a hard fight won the day, so that now the whole moral tone of shows has vastly improved.

The work is illustrated with reproductions of several portraits of Tegetmeier and also of a number of sketches and cartoons mostly taken from the Savage Club Papers, of which club he was an original member.

Robinson and Kloss on the Birds of Kedah Peak.

[The Natural History of Kedah Peak. By H. C. Robinson and C. Boden Kloss. J. Fed. Malay States Mus., Singapore, vol. vi. 1916, pp. 219-244.]

Dominating the roadstead of Penang and isolated from all the other mountains of the Malay Peninsula, the Kedah Peak attains a height of 3976 feet. As very little zoological collecting had ever been done on the mountain, and its isolated position seemed to offer chances of interesting results, Messrs. Robinson and Kloss recently made, with the help of three trained Dyak collectors, a thorough search of the mountain, but with rather disappointing results, as it was found to be singularly barren of bird-life both as regards species and individuals. A list of the 36 species obtained includes *Prionochilus thoracicus*, a rare species which has but seldom been obtained in the Malay Peninsula.

Thayer and Bangs on the Birds of Saghalien, and on a new Song-Sparrow.

[A Collection of Birds from Saghalien Island. By John E. Thayer and Outram Bangs. Auk, xxxiii. 1916, pp. 43-48.]

A new Song-Sparrow from Nova Scotia. Idd. Proc. New England Zoölogical Club, v. 1914, pp. 67-68.]

The birds of Saghalien Island, the southern half of which now belongs to Japan, while the northern half still remains Russian, have been carefully studied by Lönnerberg (J. Coll. Sci. Imp. Univ. Tokyo, xxiii. 1908, art. no. 14), and the

present collection of about 150 specimens, collected by Prof. L. Munsterhjelm and now in the Museum of Comparative Zoology at Cambridge, Mass., does not add very much to our knowledge, though lists such as these are always interesting, especially when as here the specimens are accurately dated. No new species are described.

The second paper contains a description of *Melospiza melodia acadica*, subsp. n., from Nova Scotia, and, though published in 1914, is not to be found in the 'Record' for that year, probably owing to the fact that the periodical in which it is published is not to be found in any of the zoological libraries in London.

Wetmore on Porto Rico Birds.

[Birds of Porto Rico. By Alex. Wetmore, Assistant Biologist. U.S. Dept. Agr. Bull. no. 326, 1916, pp. 1-140, 8 pls., 1 map.]

This paper was prepared by Mr. Wetmore as a result of the investigations made by him on behalf of the Biological Survey at Washington, and chiefly from an economic point of view. The field-work in Porto Rico covered the entire island, and continued for about nine months from Dec. 1911 to Sept. 1912.

Mr. Wetmore finds Porto Rico very poor in bird-life as regards the number of species, both as compared with Cuba and Jamaica, and even more so as compared with corresponding latitudes in Mexico and Central America. He estimates the total number of species and subspecies at 162, of which 94 breed on the island and 25 are peculiar to it.

Porto Rico is a highly cultivated island, the low-lying coast-lands being given up chiefly to sugar-cane, and the elevated interior being planted with coffee and citrus-groves; these three crops have all their special insect-pests, and it is the object of this paper to show which birds are most useful in destroying the pests. Among these the Martinete (*Butorides v. cubanus*), the Falcon (*Falco s. loquacula*), the Clerigo (*Tolmarcus taylori*), and the Mozambique (*Holoquiscalus brachypterus*) appear to be the most efficient.

The introduction is followed by a list of all the birds

known to inhabit the island, with their native names, their status, and a special paragraph about their food as deduced from the study of the stomach-contents; about 2200 stomachs were collected and investigated. A coloured plate by Mr. Fuertes of *Todus americanus*, one of the most characteristic birds of the island, forms a fitting frontispiece to this excellent piece of work.

Witherby on Bird-marking.

[The "British Birds" Marking scheme. Progress for 1915 and some results. By H. F. Witherby. 'British Birds,' London, ix, 1916, pp. 222-229.]

As would naturally be expected, the progress of the 'British Birds' marking scheme has been considerably handicapped by the war. The total number of birds ringed in 1915 is 7767 as against 13,024 in the previous year, but, considering the times, this must be regarded as quite satisfactory.

Among interesting recoveries reported are the following:—A Redstart ringed in Westmorland in June was recovered the following October in Portugal. Swallows ringed in June and August 1914 in Staffordshire and near Birmingham were recovered in May 1915, at the same places where they were ringed. This has also occurred in the case of a Martin, a Sand-Martin, and a Wryneck, showing how individual birds return to the spot where they were bred. There are many other interesting results recorded, and we must congratulate Mr. Witherby on his continued success in carrying on this most useful and valuable work.

Cassinia.

['Cassinia.' A Bird Annual. Proceedings of the Delaware Valley Ornithological Club of Philadelphia for 1915. Publ. March 1916.]

As usual, 'Cassinia' contains a number of scholarly and well-written articles, of which the most interesting to European readers is undoubtedly that on Titian Ramsey Peale by Mr. Witmer Stone.

Titian Peale was the fourth and youngest son of Charles

Willson Peale, the artist of the revolutionary period, and later on the founder of the Museum which afterwards bore his name. Titian, who was born in 1800, was the naturalist of the family and began his extensive travels as a collector at the early age of 17, when he accompanied William McClure, Thomas Say, and George Ord on a trip to Georgia and Florida, the latter still a Spanish possession. Two years later he accompanied Say as assistant zoologist on Major Long's expedition to the Rocky Mountains, when Pike's Peak was ascended for the first time, and whence large collections of birds and other natural history objects were brought back. His longest expedition was as naturalist to the United States Exploring Expedition under Capt. Chas. Wilkes, which started in 1838 and was gone about four years. Peale's report on the Mammals and Birds of this expedition was issued in 1848, but without the plates which he had prepared for it. This is one of the rarest of scientific works. Only about 90 copies were issued by the U.S. Government, the remainder having been destroyed by fire. What happened subsequently is not accurately known, but eventually John Cassin prepared a new report, published in 1852, with Peale's original drawings. It is said that Peale considered himself badly used in the matter.

From 1848 till 1873 Peale had a post in the Patent Office at Washington. After this he returned to Philadelphia, where he occupied rooms at the Academy of Natural Sciences, and spent his time completing the manuscript and plates of a work on butterflies based on his collection. He died of pneumonia on 13 March, 1885. Mr. Stone's article is full of interest, and is embellished with a photogravure reproduction of a portrait.

The other articles in 'Cassinia' are of more local interest, and include a pleasant account of a summer trip to Pocono Lake in the Allegheny Mts., in search of Warblers' nests, illustrated with photographs of the nest of an Alder Flycatcher and of a Yellow-billed Flycatcher by Mr. J. F. Street. A calculation of the percentage of clutches raised to maturity out of the number of those examined in the neighbourhood

of Camden, New Jersey, a city of 100,000 inhabitants, is given by Mr. Julian Potter. The number which succeeded is remarkable. Among hollow-tree dwellers it was 82 $\frac{0}{10}$, ground-nesters were 51 $\frac{0}{10}$, and tree- and bush-dwellers 43 $\frac{0}{10}$. The usual report on bird-migration in the Delaware Valley by Mr. Witmer Stone, and notes on the rarities which have occurred during the past year, all contribute to make a most successful number of one of the best of the American ornithological publications.

Journal of the South African Ornithologists' Union.

[The Journal of the South African Ornithologists' Union. Vol. xi. no. 1. Pretoria, December 1915.]

The present number of our contemporary in South Africa, though dated December 1915, only reached us on May 18. We do not know when it was actually published, but we presume some time subsequently to December 1915. If so, the date of publication should be given as the omission may give rise to considerable confusion in later years.

The longest and most important paper in the present number is one by Mr. C. F. M. Swynnerton. He recounts from the ornithological point of view the numerous experiments he has made on the relations of birds to their insect prey, especially butterflies and moths. The present series deals with the Wood-Hoopoe (*Irrisor erythrorhynchus*), the Hornbills (*Lophoceros leucomelas* and *L. melanoleucus*), and the Babbler (*Crateropus kirki*).

The feeding experiments (seventy-three in number) with these species are all given in considerable detail, and the final pages contain a discussion of results and conclusions. This contains the pith of the paper, and deals first with methods of attack in the case of stinging insects such as wasps, or hard glossy beetles, or swiftly flying insects such as butterflies. Another paragraph deals with methods of search, and tells how careful and minute is the search of bark, twigs, and leaves by the smaller birds such as Warblers and Tits, and the way in which large parties of diverse species join in a combined "drive" through the

woodlands. Another paragraph deals with the amount of discrimination shown by various species in eating nauseous or semi-nauseous insects, and how much depends in this case on the appetite and state of repletion of their stomachs. Finally, from his experiments Mr. Swynnerton is convinced of the fact that birds are able to communicate with each other as to whether insect prey is palatable or otherwise. The whole paper is crammed with observations and deductions in regard to all these points and should be read by all who are interested in these matters.

Of the other papers, Mr. H. L. Hare writes on the birds of the Philipstown district of Cape Colony. This is one of the desert parts of the country bordering on the Orange River, and many of the author's observations are of considerable interest. Mr. E. C. Chubb of the Durban Museum records the capture at Port Shepstone in Natal of a young Common Tern ringed at Rossiten, the Bird Protection Station in Prussia. He also is able to add the Black-tailed Tropic-Bird (*Phaëton lepturus*) to the South-African list, as an example of this species was shot by Mr. Alder near Durban in 1912.

Mr. John Wood writes a charming essay on the Curlew in South Africa, where it is chiefly found between October and February, though some individuals remain through the other months of the year, but it has never been known to breed.

Altogether the editors are to be congratulated in having been able to produce so interesting and full a number during these times of stress and duance.

List of other Ornithological Publications received.

- MATHEWS, G. M. The Birds of Australia. (Vol. v. pt. 3. London, 1916.)
THORBURN, A. British Birds. (Vol. iii. London, 1916.)
WITHERBY, H. F. The Moults of the British Passeres, with Notes on the Sequence of their Plumages. ('Brit. Birds,' ix. 1915-6.)

- Austral Avian Record. (Vol. iii. No. 3. London, 1916.)
 Avicultural Magazine. (Third Series, Vol. vii. Nos. 6-8. London, 1916.)
 Bird Notes. (New Series, Vol. vii. Nos. 4-6. Ashbourne, 1916.)
 British Birds. (Vol. ix. Nos. 11, 12; Vol. x. No. 1. London, 1916.)
 California Fish and Game. (Vol. ii. No. 2. San Francisco, 1916.)
 The Condor. (Vol. xviii. No. 2. Hollywood, Cal., 1916.)
 The Emu. (Vol. xv. pt. 4. Melbourne, 1916.)
 The Irish Naturalist. (Vol. xxv. Nos. 4, 5. Dublin, 1916.)
 La Science Française. (Tomes i., ii. Paris, 1915.)
 Messenger Ornithologique. (1916, No. 2. Moscow, 1916.)
 The Scottish Naturalist. (Nos. 52-54. Edinburgh, 1916.)
 South Australian Ornithologist. (Vol. ii. pt. 6. Adelaide, 1916.)
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XXVII.—*Letters, Extracts, and Notes.*

The Rev. William Henry Hawker.

SIR,—Among the original members of the British Ornithologists' Union was the Rev. William Henry Hawker, an accomplished naturalist. In an obituary notice published in 'The Ibis,' 1874 (p. 464)—the year of his death—it is stated that he was not a contributor to the pages of this Journal. Again, in an appreciation published in the Jubilee number of 'The Ibis,' 1909 (p. 101), we find the same statement. These notices are not correct; for he was, on the contrary, one of the very earliest contributors to the new publication.

In the opening volume of 'The Ibis' for 1859 (p. 330) may be read a communication in which Mr. Hawker describes the supposed nesting in Hayling Island of the "Ash-coloured" Shrike, *Lanius excubitor*.

In both the above mentioned notices Mr. Hawker's christian names are correctly given, but in the Subject-Index, 1859-1894 (p. 56), his initials are confused, for, as contributor to 'The Ibis,' his name is entered as "Hawker, Rev. E. W.," while it is given correctly in the notice of his death on the same page.

It is curious that three mis-statements should occur in connexion with the same individual, but my own excuse

for venturing to write is the circumstance that I feel a natural concern that every detail made public about Mr. Hawker should be accurate, since the place from which I write was his, and every day I have to thank him for a home made interesting and beautiful by his knowledge and his care.

I am, Sir,

Ashford Chace,
Petersfield, Hants.
15 May, 1916.

Your obedient servant,

AUBYN TREVOR BATTYE.

Directive-marks in Nestling Birds.

SIR,—In Mr. C. F. M. Swynnerton's interesting paper on the "Coloration of the Mouths and Eggs of Birds," *Ibis*, *antea*, p. 274, he says that the "directive-marking" explanation, undoubtedly applicable in certain cases, is "Mr. Pycraft's." Is this a fact?

The question as to who first published the explanation is not a very important one, since it is one which might occur to any reasoning being; but it is well to be accurate in even trifling matters.

On December 1898 I published a short article in 'The Avicultural Magazine,' 1st ser. vol. v. pp. 25-27, in which I expressed my conviction that the ornamentation of the mouth in the young of *Poëphila mirabilis* was merely a guide to the parents when feeding their nestlings, and I quoted Mr. St. Quintin and Mr. Meade-Waldo as agreeing with me in this view of its object.

I subsequently gave examples of the nestlings to the British Museum, and talked the matter over with Mr. Pycraft, who also approved of my view; but if, previous to that date, he had published any observations on the subject, he did not inform me of the fact.

Yours faithfully,

A. G. BUTLER.

"The Lilies,"
124 Beckenham Road,
Beckenham, Kent.
14 April, 1916.

Habits of Nestling Birds.

SIR,—After reading Mr. Swynnerton's account of the coloration, etc. of nestling birds, I venture to record the following note on the behaviour of young birds at night. Two or three years ago my attention was drawn to a fact that was contrary to what I had previously supposed—namely, that in the case of young Robins which were more than half-fledged, the old bird did not roost on, nor even near, the nest at night. Moreover, when the nest was touched, the nestlings went through a curious spasmodic action. With their shoulders hunched and quills ruffled, they jerked themselves up and down until the nest shook, meanwhile thrusting their heads to and fro, and making a low snapping sound with their bills which was quite unlike any sound I have heard from them by day. This spasm of movement lasted, roughly speaking, for from ten to twenty seconds, and was most characteristic though rather difficult to describe. It seemed to be quite automatic, in response to the stimulus of touching the nest, and the birds' eyes were shut all the time. During that and the following summers I have visited various nests at night, and have always got this behaviour more or less marked in Robins, in which species I have never seen the old bird roosting at the nest. In Blackbirds and Thrushes I have never seen it—there the parent frequently roosts with the young. I saw it again very markedly in the case of a brood of young Nightingales—here the old bird was roosting on a twig beside the nest—and less distinctly in some Chaffinches, where the old bird was not seen.

Yours truly,

M. D. HAVILAND.

Old Hall,
Newnham College,
Cambridge.

12 May, 1916.

SIR,—In connection with Mr. Swynnerton's remarks on "warning coloration" and the comparative "edibility" of certain species in the last number of 'The Ibis,' it might

be interesting to draw attention to a case where an inherent dislike for the flesh of a bird has been entirely overcome by artificial means. I refer to the case of a trained Peregrine Falcon which has been educated to kill and eat a Rook, the latter species being probably quite immune from attack in the wild state. That falconers have no little difficulty in overcoming this pronounced prejudice is very clearly proved by reading Mr. Harting's instructions on how to "enter" a Falcon to this distasteful quarry "Feed her for some time previously on very dark-coloured pigeons, or give her the leg of a black-plumaged fowl to "tire" on, and when she has eventually killed her first Rook (with a line on) a freshly killed Pigeon should be adroitly thrust up from under the Rook's outstretched wings, and cut open in such a way as to enable the Hawk to get a mouthful of the Pigeon instead of the Rook" (*cf.* "Hints on Hawks," p. 68).

With regard to the peculiar mouth ornamentations found in certain nestling birds, Mr. Swynnerton has brought together a fund of extremely interesting information. Although he does not say so in so many words, he seems to infer that these characters are constant in the species possessing them. When I wrote my 'Ibis' article in 1907 I was under the same impression, and it was not until 1913 that I realized that the tongue-spots, at any rate, were subject to a certain amount of variation. On July 29 of that year I found a nest of the Common Skylark (*Alauda arvensis arvensis*) containing three young birds. Upon the tongues of these nestlings the usually conspicuous basal spots were entirely wanting. Subsequently I have noticed that these basal marks occasionally vary, not only in size but also in shape, and this may sometimes be seen in members of the same brood.

Yours truly,

COLLINGWOOD INGRAM, Captain.

Westgate-on-Sea.

12 May, 1916.

B. O. U. Special General Meeting, held April 12, 1916.—
On the proposal of Mr. Ogilvie-Grant, seconded by Mr. Selater, Mr. H. J. Elwes was unanimously requested to take the Chair.

The Chairman read the notice convening the meeting and explained the circumstances under which it had been summoned.

Mr. R. W. Chase then moved:—

“That a vote of confidence in the former Committee be passed and that they be requested to allow themselves to be re-elected.”

This was seconded by Mr. A. H. Evans, and on being put to the meeting was carried unanimously.

Mr. Stuart Baker, on behalf of the Committee, thanked the members for their appreciation of the services of the Committee, and stated that they would be willing to again take up office.

At this point Mr. Elwes offered to relinquish the Chair, but at the general request of the meeting he continued to preside.

The following resolution was then moved by Col. H. W. Feilden and seconded by Mr. E. Bidwell:—

“That the name of H.M. King Ferdinand of Bulgaria be and hereby is removed from the list of Ordinary Members of the Union.”

On being put to the meeting this resolution was carried, there being only one dissident.

Certain remarks having been made as to the inadequacy of the present Rules, the Chairman said that it appeared to be the general opinion that they needed careful revision, and he was therefore glad to announce that the Committee had decided to consider the question of revision of the Rules for submission to the next Annual General Meeting. In the meantime they would welcome any suggestions from members to that effect.

Dr. H. O. Forbes then proposed that the names of all enemy alien members be removed from the Lists of Members of the Union, but the Chairman ruled him out of order and explained that the same question had been considered at a Special General Meeting called for the purpose only three months previously.

Mr. G. A. Macmillan, Secretary of the Hellenic Society, stated that the Royal Society had been approached on the question of taking action against enemy alien members, and it was decided that should a meeting of members of Scientific Societies be summoned by the Royal Society to consider this question, the B. O. U. should be represented thereat.

The meeting then closed with a hearty vote of thanks to the Chair.

Recent accessions to the Natural History Museum.—We hear that Mr. A. L. Butler has recently presented to the Museum the remainder of his magnificent collection of Soudanese birds in addition to those previously given. He has also included in his gift a valuable collection of birds from Ceylon and a series of beautifully prepared skins from Great Britain, Europe, and India as well as special collections of Paradise-Birds, Kingfishers, and Pittas. The Indian collections were made by the late Lt.-Col. E. A. Butler—Mr. A. L. Butler's father, who has recently died.

The Soudanese collection alone consists of 722 skins and includes the types and unique examples of *Cisticola butleri*, *C. wellsi*, and *Lagonosticta butleri* collected by Mr. Butler in the Bahr-el-Gazal.

Another very valuable accession recently received in the Bird-room is a selection of the collection of birds recently made for Mr. E. J. Brook by Mr. Walter Goodfellow in the high mountains of Ecuador. These specimens, 87 in number, have been chosen out of the whole collection of 1350 skins

brought home by Mr. Goodfellow and have been most generously presented to the Museum by Mr. Brook. They include the types and co-types of five new species and subspecies described recently by Mr. Chubb (Bull. B. O. C. xxxvi. 1916, pp. 46-47), viz., *Asio galapagoensis æquatorialis*, *Ciccaba albitarse goodfellowi*, *Pyriglena castanopterus*, *Grallaria nuchalis obsoleta*, and *Automolus brooki*, and numerous other rare forms most of which were wanting or previously very imperfectly represented in the collection.

We should also like to draw the attention of our readers and members to the series of exhibition cases in the Bird-Gallery of the Museum. For some years past these cases have been gradually rearranged and renovated. New specimens freshly mounted have been substituted for the old ones, and the whole collection rendered more instructive by the provision of maps and additional explanatory labels.

Cases 67-72 have recently been completed in this manner and there remain only twelve more to be taken in hand. It is most important that these should be completed, and it is to be hoped that the Trustees of the Museum will see their way to provide the necessary funds to complete the work.

Notice to Members of the British Ornithologists' Union.—The attention of members is drawn to the proposed revision of the Rules of the Union mentioned above (p. 524) and the Secretary will be glad to receive suggestions as soon as possible.

Members are also reminded that a form of proposal for candidates for Ordinary Membership of the Union is inserted in every copy of 'The Ibis' each quarter, and that ladies are now eligible for membership. As the Union is in need of further support, it is hoped that every member will do his best to increase the membership.

A number of members have not yet instructed their Bankers to pay the increased subscription of 25s. in place of

the former sum of 20s. The Secretary will be much obliged if these members will give the necessary instructions as quickly as possible. New "Banker's Order" forms for the purpose can be had on application.

Oological Dinner.—It is proposed to hold the second annual Oological dinner on Wednesday, September 13th, 1916, at 7 o'clock, at Pagani's Restaurant, Great Portland Street.

This dinner will be open to all naturalists specially interested in Oology, and those who wish to attend, or to exhibit specimens of rare or interesting eggs, are asked to send their names to Mr. Clifford Borrer, 20 Pelham Crescent, South Kensington, at least a fortnight before the dinner.

Honour for a M. B. O. U.—The many friends of Mr. Eagle Clarke will be pleased to hear that he is to receive the well-merited reward of the honorary degree of LL.D. from the University of St. Andrews on July the 6th.

Mr. Beebe on Archæopteryx and the ancestry of birds.—An ingenious attempt to demonstrate "a Tetrapteryx Stage in the Ancestry of Birds" has just been made by Mr. C. W. Beebe in 'Zoologica,' vol. ii., No. 2. The author insists that the precocious and conspicuous development of the femoral tract in the pterylosis of nestling birds points conclusively to a stage in the development of the pro-aves when this tract was formed of large quill-like feathers, which, with similar feathers along the post-axial border of the fore-limb, afforded a parachute-like mechanism, comparable to the flying-membranes of flying-squirrels, and preceded true flight. The hypothetical restoration of this four-winged stage, which forms the frontispiece to his essay, is curiously like that which appeared in 'Knowledge' in 1906, save that this lacked the "femoral wings." Mr. Beebe seeks to justify his hypothesis by an appeal to photographs of the

remains of the *Archæopteryx* in the Berlin Museum. These, however, certainly seem to have been misinterpreted, for the feathers to which he evidently refers are those which invested the tibia. No one who has studied the original remains of this fossil would for a moment agree that these afford evidence for this "femoral tract."

A Bibliography of British Ornithology.—Messrs. Macmillan & Co. announce the forthcoming publication of a work on this subject by Messrs. W. H. Mullens & H. Kirke Swan. It will be issued in six parts, each at 6s. net, and will contain biographical accounts of the principal writers on British Birds and bibliographies of their published works from the earliest times to the end of 1912.

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Communications intended for publication in 'The Ibis' should be addressed to the **Editor**.

Members are requested to inform the **Secretary**, c/o The Zoological Society of London, Regent's Park, N.W., of any change of Address, so that the numbers of 'The Ibis' may reach them without delay.

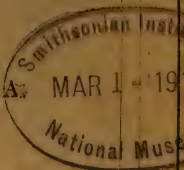
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JUBILEE SUPPLEMENT No. 2, 1915.

Report on the Birds collected by the British Ornithologist's Union Expedition and the Wollaston Expedition in Dutch New Guinea.
By W. R. OGILVIE-GRANT, Assistant-Keeper, Zoological Department, British Museum (Natural History).

Illustrated with 2 Maps, 8 Coloured Plates, and 3 figures in the text.

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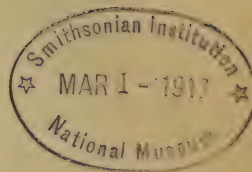
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VOL. IV. No. 4. OCTOBER 1916.

XXVIII.—*On the Coloration of the Mouths and Eggs of Birds* *.—II. *On the Coloration of Eggs*. By C. F. M. SWYNNERTON, F.L.S., F.E.S., C.M.B.O.U.

(Plate XIX. †)

PREVIOUS THEORIES.

HEWITSON wrote on the coloration of eggs in 1838, and remarked the common occurrence of uniform white in the eggs of species that lay in holes. I am unfortunately unable to state his further views here, or Seebohm's, as, through pressure of much work at the last, I left England without having looked them up. Prof. Newton ('Dictionary of Birds,' p. 188) says of Hewitson that "his remarks on the coloration of eggs have been frequently repeated, of course with more or less modification and verbose addition, by various plagiarists who have sometimes forgotten to mention the source of their information."

The only other theorist mentioned by Prof. Newton in this connection is Dr. McAldowie ("Remarks on the Development and Decay of the Pigment Layer in Birds'

* For Part I. see pp. 264-294.

† For explanation of plate, see p. 606.

Eggs," Journ. Anat. & Physiol. xx. 1886, pp. 225-227). Dr. McAldowie, starting on the assumption "that the pigmentary coat on birds' eggs came into existence at a very early period . . . and existed in the eggs of the progenitors of all the extant species," suggests "that its primary use is for protection from the solar rays, but that," the pigment being "unstable and variable" and change therefore easy, "it afterwards became modified for concealment." Finally, "eggs acquire a highly developed pigmentary layer, or lose their pigment entirely, according to whether they are exposed to the full glare of the sun or laid in situations inaccessible to its rays, and . . . the intermediate degrees of coloration are in direct ratio to the amount of light to which the eggs are exposed."

The theory might be regarded as receiving support from the fact that a considerable number of white eggs are laid in holes, and from such instances of apparent paling as those of the Jackdaw and Puffin. But it is interesting to note that there is no such additional pigmentation of tropical eggs as there is, apparently, of the skins of tropical mammals. Amongst tropical eggs it is interesting to contrast the deeply pigmented Nightingale-like eggs of *Cossypha natalensis*, laid in tree-hollows in the dark places of dense forests, with the cream or white eggs of *Chalcopelia afra* and *Colius striatus* that are laid not only in an open nest in isolated, often semi-leafless, small trees or shrubs in grass-country at the hottest time of the year, but are quite commonly exposed to the direct sunlight. Prof. Newton gives a number of similar instances (*ibid.* p. 189), and many will at once occur to everyone.

Wallace's view ('Darwinism,' 1889, pp. 122-126) amounted to this:—All eggs were originally white. Those species that have continued to protect their eggs from direct observation—whether by laying in holes and domed nests, by covering the eggs when they leave, or (themselves possessing concealing coloration) by sitting close, or that, being powerful or fighters, keep good guard over them—have

naturally continued to lay uniform white or uniform pale eggs. In those species that have not thus concealed or defended their eggs, the latter have had to supply the deficiency by themselves (through Natural Selection) becoming concealingly coloured. A Song-Thrush's egg and a Plover's egg are both thus coloured, each in assimilation to a different environment; and small birds' eggs generally are regarded as concealingly coloured in relation to an all-concealing environment of complex lights and shadows. Doves' eggs are protected through the fact that "it is a difficult matter to discern, from beneath, whether there are eggs in the nest or not, while they are well hidden by the thick foliage above."

In brief, eggs with powerful parents and eggs concealed by extraneous obstacles to vision are white (or uniform pale), having been thus enabled to remain so; the others have developed concealing coloration.

The principle (of compensatory alternatives) that underlies Wallace's explanation is, I am convinced, the correct one. A species that lacks, for example, fighting-weight, must owe the survival of its eggs to their concealment in one way or another or to some other adequate defence or mixture of defences. Beyond this his explanation seems unsatisfactory. It is based on a sweeping generalization which is hardly, I think, supported by the facts. As Newton truly remarks and shows, by instances which might be greatly multiplied, no general rule can be laid down to the effect that eggs laid in holes and covered nests are of a uniform white. Numerous coloured eggs are found in such situations, and coloured eggs belong abundantly to powerful parents, while some coloured eggs are artificially covered in the parents' absence and others are closely covered by protectively coloured parents—for instance, the heavily and beautifully pigmented eggs of *Phyllastrephus flavistriatus*; this bird is the closest sitter I know. Conversely, there are white eggs that neither are shielded from the vision of their natural enemies, whether by close-sitting parents or other appreciable objects, nor possess

fighting parents—or any other special protection that we can see, unless it should be contained within themselves—*Colius striatus*, to take one example out of several. How account for the survival of these and the pigmentation of the others? It would seem that the first must possess some defence—some counteragent to conspicuousness—that we have overlooked, while the other class of case suggests that concealment may not be the only function of coloration in birds' eggs, though the pigmentation might in some cases be explained away as having unnecessarily outlived a period in which concealment by colour, and not its present defence, was the species' special protection.

Other points are overlooked in Wallace's explanation. It is the nest or nesting-hole, not the egg, of nearly all arboreal species that the enemy will specially look for and usually first detect. Having found it, he will not rest contented with trying "to discover from beneath whether there are eggs in the nest or not." If he is a natural enemy he will look in. And the nests of quite a number of species, as also many nesting-holes, tend to be, to a greater or lesser extent, conspicuous (especially in relation to the close search of an enemy), even when neither inaccessible nor the property of formidable owners. In any case, having regard to the habits of enemies, the line is drawn in the wrong place as between white eggs and all the rest. For numerous coloured eggs are also, as I wrote four years ago, "in brilliant contrast to the nests they lie in."

Finally, the argument that the eggs of most small birds lie in surroundings (of complex lights and shadows) that are capable of concealing objects of *any* colour might, indeed, account for the survival of coloured eggs, and even for the fact of their pigmentation, but it will not account for their specific coloration—for its diversity and for that quality of striking, even brilliant, distinctiveness which is so marked a characteristic of the eggs of birds.

To sum up, not only a number of difficult cases are left unexplained, but also the very thing which most requires an explanation.

PRESENT EXPERIMENTS.

In Prof. Newton's words, the subject was "worthy of much more attention than it has received." In July of 1911, while thinking out the general bearing of my results from insectivorous birds, I saw that they suggested the explanation for distinctiveness and diversity—in, at any rate, insects—that I have described in the first part of this paper: briefly, that most species are in varying degrees indigestible and liable to be refused when the enemy's gastric activity is insufficient to deal with them—that, therefore, there are relatively few species that do not require to be distinguishable at times from species that the enemy is at the moment hungry enough to digest.

Would the explanation also apply to the eggs of birds? occurred to me at first as an objection.

That it might be found applicable to the coloration of adult birds was rendered likely enough by the results of Marshall's experiments already referred to. There was no such evidence for eggs. Yet, working for some years with insects, I was already able to perceive that there is a close similarity between the phenomena of the coloration of birds' eggs and those of the coloration of butterflies, in spite of the fact that we have in the one case a generalized pattern and in the other a definite one, and to feel that whatever interpretation completely explained the one set would quite likely be found to fit the other. I had also met with eggs broken in the nest, not by the parents, yet uneaten. And the difference in flavour and consistency between, for example, Fowls', Ducks', and Plovers' eggs, even when cooked, suggested that at any rate a basis for possible preference on the part of enemies might be present. These and other considerations convinced me that the idea was at least worth testing.

I tested it in January and February 1913 on a lemur (*Galago crassicaudatus* Geoffr.) and a black rat. Attempts to secure other egg-eating animals were unsuccessful. The experiments carried out were sufficiently numerous and very

careful, and were based on the experience afforded by nearly seventeen hundred such experiments that I had already carried out in other directions. Both animals showed unmistakable preferences as between the eggs of different species. The lemur, it is true, showed them (like some few insectivorous birds) only when nearing repletion-point—an inadequate support for the hypothesis I was testing. The rat commenced to refuse certain eggs even when fairly hungry. And their preferences coincided.

Nothing could have been more marked than some of the contrasts between obvious repugnance and eager acceptance that occurred throughout the experiments on the rat. I wished, nevertheless, to suspend judgment until I should have tested the point on some other animal. A Butcher-bird (*Lanius collaris humeralis*) was secured later in the year, but it would eat no eggs at all except under pressure of great hunger. I had all along been particularly anxious to obtain some bird of the Crow family for these tests, an adult bird with wild experience, but I failed, both in Africa and, later, in England. They have been scarce latterly at Chirinda. A young Jay, which Mr. Seth-Smith was so good as to let me have from the Zoological Gardens (with the kind permission of Mr. Meade-Waldo, the original donor), gave me some very interesting preferences as between different species of earth-worms and of snails; but, to judge from its early mistakes even here (and from my experience of hand-reared nestlings generally), its education in egg-tasting would have entailed a wholesale robbery of nests that I should have been sorry to undertake. With a carnivorous mammal the experimenter is not confronted with this difficulty. Its choice (by smell and taste) is at all times so wonderfully unhesitating and accurate, that, to all appearances, it is partly instinctive. So, failing in an attempt to get a weasel, I used an Indian mongoose.

Genuineness of the Preferences.—The mongoose eagerly smelt or tasted every kind of egg offered it; but, from the outset, it resembled the rat in showing the strongest preferences—though probably none of the eggs tested were

disliked by it so greatly as was a Burnet moth. As in the case of the rat and the lemur, I carried out, not one, but several experiments to make quite sure that I was not suffering from self-deception, or the mongoose from some sort of misapprehension; and, as before, I sometimes used every sort of endeavour to *coax* the animal to eat the eggs it refused. It was my genuine endeavour (as it is always) not to prove my theory, but, if possible, to disprove it. In this I failed, and friends staying with us were equally struck with the strength of the preferences shown. One of these friends was Mr. Guy A. K. Marshall, my original guide and mentor, and the only person to whom (pending my own final satisfaction) I had yet mentioned the idea—in a letter written from Africa two and a half years before. In view of this fact—in view, too, of his personal experience in this kind of experimentation and of his acute faculty for criticism (well known to entomologists)—I was particularly interested and pleased to obtain from him an expression of his complete satisfaction as to the actuality of the preferences witnessed.

Indeed, the method employed admitted of no doubt. It was not a mere putting down of two or more eggs and seeing which was taken first, the animal being all the time prepared to eat the others too. Certain eggs left under the animal's nose were seen to be persistently ignored after tasting or smelling, while eggs of another species placed amongst them were each time at once picked out and eaten, the mongoose even, in the case of certain species, returning to the empty shell again and again, and licking it out afresh, or, in his eagerness, crunching it up, while still emphatically and obstinately refusing the rejected eggs, though these looked most tempting with their glistening contents brimming over the hole which I always made to avoid complications through varying strength of shell.

I wanted yet more evidence, however, and it was not till eight or nine months later that I finally decided to communicate my experimental results, and (with due reserve) the view they suggested to a meeting of the British Ornitho-

logists' Club *. Publication and discussion seemed, after all, at this stage, the best way to elicit any evidence there might be for or against. Several criticisms were made.

CRITICISMS.

I would like to make it clear that, if I discuss these criticisms somewhat fully here, it is done in no controversial spirit. I do so, partly because the fact that some of the criticisms were made at all shows that I was insufficiently explicit at the meeting, and I wish to be allowed to rectify my omission ; secondly, because, even if we do not yet possess field-evidence in favour of preference in eggs, I can show that such evidence as exists is, at any rate, by no means incompatible with its existence, and I wish to make out a case for its fair and impartial consideration.

The two most important criticisms were :—

(1) The *unreliability of results obtained from captive animals*, and (2) The *lack of corroboration from field-observation*. It is a curious fact that it is just these two objections that critics have mainly used against the selectionist explanations of coloration in insects, that I had already been testing their validity in the latter connection for some years before I undertook my egg-experiments, and that I was to read a paper in which they were very fully discussed on the very next day. For a fuller statement than I can make here I would like to refer my readers to my paper read at a meeting of the Linnean Society on April 15, 1915.

(1) My experience in connection with the first objection has been that it is perfectly true that some animals in captivity mope, have capricious appetites, and are generally useless for food-experimentation. I have found, however, that these animals are easily recognised and eliminated, and that most animals give very consistent and reliable results—always provided that they are well cared for and tolerably happy, friendly with the experimenter, and provided with a rational diet. This should include enough of the class of

* Bull. B. O. C. xxxv, 1915, pp. 108–112.

prey that is being particularly experimented with to avoid an undue craving for it. Naturally the experimenter must also know the principles on which an animal feeds: my own early experiments, before I gradually learned these and discovered the various complicating factors that must be eliminated or watched for, were worth very little. He must realize that a hungry animal will eat almost anything that comes within the category of its natural prey, and not jump to the conclusion, when it does so, that it is necessarily indiscriminating at all times. He must know something of the animal's state of hunger at the outset and recognize the symptoms of growing repletion, must be able to follow the twists and turns of an appetite increased a little through ten minutes' fasting, decreased through a further morsel of food, or, it may be, stimulated suddenly by a specially savoury offering or depressed by an unsavoury one. And so on. It is insufficiency of knowledge on such points that has vitiated some food-experiments in the past and caused the results obtained sometimes to seem contradictory and unreliable. That the method may, carefully used, yield perfectly reliable results is indicated, I think, by the fact that in my own experiments wild insectivorous birds corroborated in the most ample manner the results I had obtained from captive birds, while totally unrelated carnivorous mammals (one of them unconfined) confirmed generally each other's verdicts on bird and mammal prey. That my egg-experiments only (and these the last to be carried out, with the precautions suggested by their predecessors) should, for some reason, be unreliable, is, indeed, perfectly possible, but not very likely, though they certainly require to be corroborated, as my insect-experiments were, in the field.

(2) "Non-corroboration from field-observation." In insects this objection has been brought against two views: (*a*) that birds eat butterflies; (*b*) that insectivorous birds have preferences. In each case the abundant results of specially-undertaken observation at once showed that the reason for the paucity of evidence had been a previous *lack* of special observation. Yet entomologists had had their

attention drawn for years to the scantiness of the evidence. How much more intelligible is it that we should have accumulated little evidence on a possibility to which our attention has never till now been drawn?

(3) *Acceptances were regarded as showing Indiscriminate-ness.*—As Mr. Jourdain very truly said, the Carrion-Crow devours all kinds of eggs. It would be surprising if it did not, for *a hungry animal will eat almost anything that comes within the category of its natural prey*. But this does not necessarily imply indiscriminate-ness. The wild bird on which I experimented most largely was an individual of *Dryoscopus guttatus*. When hungry enough, as it frequently was, it would readily accept the most nauseous insects I could offer it, and its acceptances of such extremely low-grade butterflies as the *Danainæ* and *Acreinæ*, witnessed by myself, perhaps nearly equal all other records put together—the very records on which critics have relied to demolish the theory of mimicry. Yet this self-same Shrike was a most discriminating bird! It only took two or three acceptances when it was at its hungriest to carry it beyond the *Acræa*-accepting stage, and, as it gradually filled up, it discarded species after species until, nearing repletion-point, there were only a few species left that it would accept at all. The same may be quite true of the Carrion-Crow.

Or, of course, it may not. Numerous insectivorous birds are as discriminating as the *Dryoscopus*. A few, however, fill up very considerably before they commence to discriminate—at any rate, in relation to certain large classes of prey. Some, again, are specialized to feed nearly to repletion on what are, to other birds, the most nauseous of insects. The case of the lemur suggests a likelihood of similar variation in digestive capacity amongst egg-eaters.

Mr. Stuart Baker mentioned that he had not experimented, but he had kept egg-eating birds and mammals and noticed no discrimination. My own non-experimental experience (though in another connection) was entirely the same as his, and I will use it to illustrate the difference between casual offerings and carefully-conducted experiment. Long ago I

had a Roller in my aviary. I frequently went in and fed it by hand. On a few of these occasions I offered that large, gaudy, evil-smelling locust, *Phymateus*. It was each time readily eaten. I also found it in the stomachs of one or two wild Rollers. I concluded, very naturally (and I believe I was rash enough to publish the conclusion) that Rollers are probably highly indiscriminating. A few years later I began definitely to *experiment* on Rollers. Then I found that, while they readily ate *Phymateus* up to a certain point in the satisfaction of their hunger, that point was by no means a very advanced one, and that from that point up to repletion-point they refused it with symptoms of dislike. Again, my mongoose sometimes left the eggs that formed part of his ordinary diet uneaten for quite a time. Had this occurred in the days of my first Roller I would have perceived no significance in the fact. The other fact, that they were always sooner or later devoured, would have satisfied me that they were all much liked, and the delay, if I thought of it, would have been put down to repletion. Had I experimented, I would sometimes have found (as I sometimes did find) that the mongoose was far from repletion and eager for food—but not as yet for that particular egg.

When told of acceptances, we should ask: how hungry was the animal? What went just before—was there, perhaps, special stimulation? Could there have been a special craving through the insufficient presence of that class of food in the everyday diet? Were not the eggs, perhaps, in any case all of a high-grade nature? Unless the first three questions can be satisfactorily answered, the acceptances, whether by wild animals or tame, are completely valueless as evidence of indiscriminateness. No number of unchecked records of eggs eaten can ever show that those eggs are not sometimes, perhaps often, refused.

Similarly, acceptances that are not seen to be accompanied by neglect or rejection of other species—or their relative immunity in the same locality—are quite useless as evidence of preference, and this is why such evidence must always be hard to procure in the field. It can only be obtained in

quantity by continuous watching and special experimentation.

4. *The Use of unsuitable Animals.*—This criticism was made of the offering of terrestrial eggs to a lemur and arboreal eggs to a rat. I had probably not been sufficiently explicit. I offered to each animal eggs of *both* categories, and each showed preferences in his own department, as well as confirming the other's preferences in his. The former fact is all that need really matter, and the additional confirmation was, at any rate, useful and suggestive.

The critic's point was that refusals of unaccustomed objects might be merely due to their non-recognition as possible food. Had a totally new *kind* of food been offered the criticism was perfectly sound, as I could quote numerous instances to show: horses transferred for the first time from an arid pasture to lucerne (Burt-Davy), nestlings reared on a very limited diet and dogs put on to a quite new food (my own observations), camels and natives of Jerusalem (Cyril Crossland)! But within the classes of food that they are accustomed to prey upon, wild animals are great experimenters, and, as anyone who has experimented much on them will know, a new appearance here is merely a special incentive to trial. My African birds, though not hungry, attacked with the greatest zest various Oriental and South American butterflies that I showed them—some of them of highly nauseous species, and all representing appearances that they had never seen before. Similarly, to an egg-eater an egg is recognizable as such whatever its coloration. If the pattern be new, so much the worse for the egg. A Monitor that came into the possession of my friend Mr. T. Honey, the energetic Curator of the Lourenço Marques Gardens, refused raw beef until forcible feeding with it showed it that it was a suitable food, but from the first it readily attacked fowls' eggs, though it had probably never met with them before. A lemur that I captured in the thick of the Jihu jungle, far from any human habitation, and to which I offered an unbroken hen's egg that very day, did the same. In the same way the rat, the lemur, and the

mongoose of my experiments were eager to try, and did try, every kind of egg offered them. It was only after trial—smelling, tasting, or commencing to eat—that their refusals took place. Moreover, the eggs were nearly always offered *opened* and the opened portion brought right up to the animal's nose before being deposited just below it.

I have gone into this criticism, though it was obviously (through my own fault) based on a misunderstanding of what took place in the experiments and a non-realization of the care with which they were conducted, because I find that it impressed a good many of those who heard it. Applied to the trial of Palearctic eggs on an Indian mongoose there is more to be said for it. I was myself much disappointed at having, in the end, to use that animal. But I was anxious to experiment on something further, if only for my own satisfaction, and, apart from the knowledge that I would be using eggs of genera that also occur in India, I realized from my general experimental experience that the animal's use was in reality less objectionable than at first sight it might appear. Most animals are specialized in some particular direction: some prefer Diptera, some Orthoptera, some are browsers, others grazers; yet within each large class of prey there is, despite individual differences, a wonderful *tendency* to sameness in the preferences of animals generally, even when (as often happens) they stray somewhat outside their own special sphere. In the same way imported herbivorous animals in Africa show very similar preferences to those of African Antelopes, and domestic fowls and northern migrants to those of indigenous insectivorous birds. A cat, a wild raven, and a lion showed the same preference with regard to prey which could only be regarded as the natural food of the lion. A domestic cat's preferences in birds were very similar to those of an African lemur (the lemur of the egg-experiments), and a Woodford's Owl on which I experimented confirmed in the greatest detail the butterfly-preferences of my diurnal birds, migratory and otherwise. It all shows (and I could adduce yet better evidence of the fact) that it is no pure matter of taste—

of mere capricious likes and dislikes,—but one of intrinsic difficulty of digestion, felt in greater or less degree by all enemies alike.

It matters little, in any case, whether my mongoose's preferences were, or were not, those that would have been shown by an English weasel or magpie. The important point is that he showed preference in eggs at all. Every animal I have experimented on—mammal, bird or reptile, vertebrate or invertebrate—has shown these preferences, whether the prey were plants, seeds, mammals, birds, worms, snails, insects and their larvæ, or insects' eggs. Is it likely that birds' eggs are alone exempt from so general a rule?

Arguments from analogy are frequently fallacious, and I have used many such in the last few pages; yet they are apt to be highly suggestive, and what they suggest in the present instance seems to me to be that preference in the eggs of birds is, at any rate, worth approaching with an open mind.

I will only add :—

5. *My own Criticism*.—It is, that a wild animal, having more abundant exercise, will develop a more ravenous appetite than a captive animal. I had the opportunity of testing this possibility on my wild insectivorous birds, and I found that they probably did become hungry enough to eat highly nauseous prey more frequently and easily than birds in confinement. Yet it amounted to very little. Even the wild birds soon discarded *Acræinæ*, &c., and eliminated grade after grade from their *menu* as they gradually satisfied their hunger. It would have been the same, I imagine, for my egg-eating mammals had they been in the wild state: a mere postponement of first rejection, accompanied, it might be, by a compensating postponement of final repletion. But it is on this rock, if on any, that my experiments may split.

It is also true (another criticism) that I judged that neither rat nor mongoose placed any egg at all so low as the latter placed a Burnet moth, or as either might have placed an *Acræa*, a *Mylabris*, an adult Drongo, or a Wood-Hoopoe. It may have been that, using so few species of

eggs, I did not happen to hit on the unpleasantest grades. Or it may not. In either case the principle of graded preference—of progressive elimination—remains, and this is all that is necessary for our purpose. Actually I should say that their lowest-placed eggs were to the mongoose and rat about what *Mylothris* and *Belenois* are to insectivorous birds. Both genera are, at any rate, so well protected as to possess many mimics.

IN FAVOUR OF PREFERENCE.

The remarks of two, I think, of the speakers at the meeting suggested strongly that preferences *are*, perhaps, sometimes seen in the field—the special search, for example, of certain of the British Corvidæ for particular eggs; and an interesting question, and one that might perhaps be fairly easily answered, is: Do any of the Corvidæ, as a regular practice, search thus for relatively well-concealed eggs, as those of plovers and game-birds, while conspicuous nests in the same neighbourhood remain for the time being untouched? If this were found to happen, the observation would, at any rate, be suggestive, even if the contents of some of the conspicuous nests were also eventually to fall a prey.

I have already referred to the different flavour and consistency of each of the few eggs that we ourselves most commonly use for food. Mrs. A. L. Selater, who was staying with us at the time of my rat-experiments in 1913, told me then that, as a girl, she, with her brothers, used sometimes to eat birds' eggs, and that they learned to avoid one common egg, she had forgotten whether Thrush or Blackbird, owing to its unpleasant taste. It was, therefore, with the greatest interest that I read the following passage in one of two letters, full of information, which Mr. H. M. Wallis was so kind as to write me on April 15th and 26th, respectively, after being present at the discussion on the subject: "Relative palatability of eggs. I have in all cases of difficulty sucked eggs of any value rather than trust to the blow-pipe, and have found

the flavours vary immensely. Thus, Robin, Nightingale, and Swallow are beastly. But the white eggs of the Little Bittern are as sweet and mild as cream, nor are the eggs of the Barn-Owl much inferior to them." And in his second letter he refers to the well-known strong odour of Petrels' eggs—"but, is it deterrent?"

If Petrels' eggs are by any chance of low-grade edibility—and this, in the last resort, can only be ascertained by experiment, as Mr. Wallis actually suggests it should be—I would imagine that the smell is likely to be useful for aiding in their recognition by enemies rather than deterrent in itself; just as many of the smells of insects are probably mnemonic, like their appearance, rather than directly deterrent. The real deterrent quality is usually something more deep-seated than appearance, smell, or taste, but differences in it, both of degree and kind, are commonly accompanied by differences, strong or slight, of taste and (to other mammals than man) smell; and it is on this account that the observations I have quoted are exceedingly interesting and suggestive. They amplify greatly the common knowledge that eggs vary in flavour, and extend it to raw eggs. It does not necessarily follow, of course, that flavours and smells that are agreeable to us are always associated with great digestibility in relation to natural enemies. *Danaida chrysippus*, one of the most nauseous of butterflies in its effects, has a mild and not unpleasant nutty flavour, while members of the unpleasant genus *Mylothris* smell sweetly of menthol and sweet-briar. Nor does it follow that an object which we find wholesome when cooked is necessarily as digestible to its other enemies when raw. *Monticola* is greatly disliked by my cat, which refuses to eat it even when specially starved. Yet, toasted through (feathers and all), he has readily eaten it to repletion-point.

Mr. Wallis goes on: "Although the Little Bittern lays in an uncovered, or slightly covered, nest, I have not chanced on any sucked eggs, whilst the covered nest of the Water-Rail is, in my experience, exceedingly liable to be raided by

rat and weasel." The case is not a good one, as the observations on the Little Bittern were carried out in a locality in which rats were not actually noted, though snakes were abundant ("seven asleep on one raft of reeds"), but it is useful as indicating a line of observation which may give interesting results.

He further suggests problems that, as he rightly insists, are probably explicable only in relation to a number of interacting factors, of which, however, varying degrees of unpleasantness in the egg might well be one—problems of distribution and relative success. Also, he rightly attaches much importance to the great principle of compensation, and naturally at once sees what a straightener-out of our difficulties the acceptance of nauseousness as the hitherto missing counteragent to conspicuousness in eggs would prove to be. He expects the eggs of the Nightjar and the Stone-Curlew "to be fairly edible," being protected by their own coloration and that of their parents, but thinks it likely that the egg of the Song-Thrush, a bird "not so pugnacious as a Blackbird and much less so than a Mistle-Thrush, and *far* less than the Fieldfare at the nest," will be "refused by birds and animals which would take the egg of Blackbird and Mistle-Thrush." And he mentions a great Italian marsh on which the Water-Rail (covered nest) and Baillon's Crake (open nest, "or rather tiny pad," and protectively coloured egg) were found breeding successfully. But what of the Little Bittern, with a white egg and open nest, yet "abundant" there and "enjoying a large measure of immunity"? The Bittern's sharp bill occurs to one, yet cases could be given in which there is no such escape as this from the conclusion that there is a missing counteragent.

I would suggest, finally, that the common habit possessed by birds of removing or deserting eggs or young that have been visited is surely essentially connected with the possibility of deferred attack by an enemy that was not hungry enough for them on first discovery.

SUMMARY OF THE POSITION AS REGARDS PREFERENCES.

If graded preference is found to be at all general here, it will provide us with a fairly complete and satisfactory explanation—at all events from a purely selectionist point of view—of the coloration of the eggs of birds, and much that has hitherto seemed difficult will be explained. On this account, the possibility is worth considering.

That there is a basis for possible preference in the varying composition of the contents of different eggs is suggested by their varying taste and consistency. That the former should be in some cases unpleasant to the human palate is highly suggestive, though not conclusive. A consideration of this kind (the “peculiar smell” of *Heliconidæ* and *Euplocinæ*, and the former’s possession of exsertible glands) constituted the whole of the more direct evidence on which Bates founded his theory of mimicry, now well supported by evidence and widely accepted. But, for eggs, we have in addition the evidence of a number of experiments, apparently reliable so far as they go. Does this evidence represent what occurs amongst egg-eaters generally?

The critic’s position is that, while there is nothing inherently improbable in the idea of preference, he sees no signs of it in nature*. The fairness of this may readily be admitted. But (since uncontrolled acceptances prove nothing) neither has any good evidence as yet been adduced against preference. Proof or disproof remains, therefore, a matter for special observation.

THE CLAIMS, AND A DEFINITION.

The claims made are worth re-stating briefly to avoid misunderstanding. It is not claimed that some eggs are not eaten. *All* are eaten, even with eagerness, under certain circumstances, though some are believed to be refused more frequently than others. Nor is it claimed that all egg-eaters necessarily thus discriminate, though, for the support of the theory, it would be necessary for a

* Rev. F. C. R. Jourdain, in a letter (17. iv. '15).

considerable proportion of them to do so. Nor, again, is it suggested that either colour, smell, or (necessarily) taste are in themselves protective. The real protection, causing occasional or frequent refusal (according to its strength), is believed to be indigestibility in varying degree, which can be overcome by sufficient gastric activity such as is present especially in an empty stomach, and greater in a half-filled stomach than a full one. Coloration and smell would be of use merely to enable the enemy to recognise, without breaking it, an egg, already known to him, that he is not at the moment hungry enough to digest, and the sight or smell of which, therefore, is sufficient to produce in him a feeling of disinclination.

Mimicry is worth defining briefly again in the sense in which I shall refer to it below—not that I lay excessive stress on its occurrence. It is the resemblance (brought about by the selection of the appropriate variations, large or small, “mutations” or “fluctuations”) of an abundant and more or less deterrent species (the “model”) by a species more liable to attack (the mimic). The latter’s greater liability to attack may result from a smaller power to deter (whether by indigestibility or otherwise), or from being less well known to enemies, and so more liable to suffer from *mistaken* attack; or from a combination of these relative disadvantages. It is even conceivable that points of resemblance occurring as between two equally deterrent and abundant species might be selected owing to the doubled reminding-power afforded by the combined populations and the facilitated task for the memory provided by recognition characters in common. A “mimetic association” is the colour-group formed by a model (more or less indigestible or otherwise deterrent) and its various mimics, whether these have mimicked it for increased notoriety* (being

* Not really Müllerian mimicry, though the basis is still mainly population. Müller’s view was not “more reminders, simplified recognition, and less mistaken attack,” but “equal destruction (by young enemies) whatever the population,” the greater population thus losing a smaller percentage. The first view seems the more probable and is supported by my experiments.

deterrent in themselves) or for protection from legitimate attack. Or the model round which the others, so to speak, centre, may be multiple—consisting of several related species of nearly the same appearance. It is in this sense that I suggest below that the Tits' eggs may have been the model for one association and those of the *Picariæ* for another.

An illustration will be useful. My cat was once completely nauseated by a Drongo I gave him, and thereafter "placed" Drongo very low indeed. One day I offered him, first a Drongo, then, in turn, a male Cuckoo-Shrike (*Campephaga nigra*), a Black Flycatcher (*Bradypornis ater*), and a Black Tit (*Parus niger*). I laid each on its back on the ground, in which position all, the first three especially, resembled the Drongo. The cat refused the Drongo, and thereafter refused even to come forward and smell any of the others. I now turned each one in turn on to its breast. Each was still neglected till I came to the Tit. This the cat at once came forward to, the white of the upper wing-coverts obviously showing him that it was no Drongo. I now carried out a preference experiment with meat-scrap from each bird. I found that the Flycatcher was placed nearly or quite as low as the Drongo, the Cuckoo-Shrike far higher, yet by no means amongst the species that are accepted to reptile-point. Thus (if it be a case of mimicry—as field-observation suggests), the association, as we find it at Chirinda, consists of: (1) two species of Drongo, abundant and low-grade, constituting the "model"; (2) a Flycatcher, which, being as low-grade as the Drongos, yet much scarcer, might be regarded as having mimicked them for the sake of greater notoriety; (3) a male Cuckoo-Shrike, scarcer, also higher in grade, though still to some extent deterrent, and probably, therefore, a mimic in virtue of its greater liability to both legitimate and mistaken attacks.

THEORY.

1. *The Defences of Eggs*.—The principle of alternative defences and complementation that underlies Wallace's explanation holds good. Some eggs are guarded by more

or less formidable or pugnacious parents, perhaps prompt sitters, others have close-sitting parents with concealing coloration, others again are covered in (whether in a hole, a domed or deep nest, or the interior of a dense thicket)—or covered merely when left; and it is these and other counteragents, as we may call them, to conspicuousness that, separately or in combination, have enabled them to develop or retain the latter quality in their coloration—white or spotted, or vivid blue, or (like Barratt's Bulbul) a glorious pink—and so on; a conspicuousness that, without the counteragent, might have rendered them liable to detection from some little distance.

Against these conspicuously-coloured eggs we must place those which, lacking counteragents to conspicuousness, and liable themselves to be first seen were they conspicuous, are, instead, protectively coloured—as those of Plovers.

So far, this is Wallace's explanation, but with the coloured conspicuous eggs added to the yet more conspicuous white. It explains the procryptic element in those eggs in which that element is present, and it explains how the others can afford to be conspicuous. It does not explain the latter's coloration. Nor does it explain all cases of relative conspicuousness in nests.

Missing counteragents* may help to explain some of these cases. But the great missing counteragent, capable of aiding heavily in the explanation of such cases—and of many others—is likely to be some degree of indigestibility (or "nauseousness," or "unpalatability") in the egg itself. That some degree of indigestibility (it need not be of the most marked order if other counteragents are present to complement it) may be the partial explanation of, for example, the survival of the conspicuously-laid white eggs of some Colies and Doves, and of the often very fairly conspicuous nests of Bulbuls, Shrikes, &c., was suggested by my experimental results.

* Of these, fecundity and perseverance in face of persecution may be one, hardness of shell in relation to certain enemies another, out-balancing advantages at another stage (as of food and "mentality"—*Wallis*) a third.

2. *Diversity and Distinctiveness*, also the *Tendency* to Uniformity within the Species or Form*.—Should it be found not merely that nauseousness exists, but that there is a gradation between some species of eggs that are only eaten through hunger and others that an individual enemy will eat to repletion-point, we may conclude that the need for distinguishability from pleasanter forms (parent and otherwise) is, and has been, widespread, and we shall have at least a contributory explanation for the qualities italicised above. Probably, in many cases, somewhat more than a merely contributory explanation—for inter-recognition between eggs is out of the question, and necessity for recognition by parents is probably urgent only in those species (numerous enough) that may be victimized by Cuckoos, though just possibly present (as Mr. G. L. Bates suggests) in birds that build in close colonies, where, however, it would encourage variability.

The necessity for differentiation from less deterrent parent-forms might well have been of much importance, for, unaccompanied by some distinguishing mark, a variation in the direction of greater nauseousness is unlikely to be actually selected. The selection of the curiously netted chalk layer in the egg of the Guira Cuckoo and of much else that is striking and peculiar in eggs (and in animals generally) could be in part accounted for in this way; while the oft-repeated necessity for differentiation from successive parent-forms that might accompany a very gradual or much interrupted increase in indigestibility might conceivably sometimes produce the utmost heights of distinctiveness. Whether such variability as we find in the eggs of the Guillemot will be explained as due merely to the absence of the necessity for recognition by enemies (whether through present high acceptability or the fact that an enormous annual colony and the qualities of its eggs, irrespective of coloration, will be a matter of the utmost notoriety to the

* I use the word advisedly, for such a "tendency" actually exists, in spite of the great variability of many eggs—a variability that I believe to be perfectly explicable.

enemies from far and near that will flock to it daily when hungry enough) or to a need for recognition by parents, or to both, is a problem to be solved by special observation. To a case of variability that I have myself begun to investigate (namely, Weavers' eggs) I will refer later.

Another factor contributing to diversity (within or as between species) would doubtless be Wallace's—of pro-cryptic adaptation in varying directions, often from bases already different. It would apply not only to those eggs the coloration of which does definitely contain a pro-cryptic element at present, but, indirectly, to eggs formerly in different ways pro-cryptic but now brightened through having become possessed of a counteragent to conspicuousness (*cf.* Darwin on caterpillars, *Descent of Man*, 2nd ed. p. 501 *).

3. *Conspicuousness*.—Given the existence of nauseousness, conspicuousness would be useful in relation to the mistaken attacks of enemies through the assistance it would give to recollection and recognition, and its selection might be brought about even in a but slightly deterrent species either in this connection or through any other factor making for conspicuousness whenever a suitable counteragent already existed or was developed *pari passu* with it. Where the egg is concealed up to the moment at which the enemy looks into the nest, its appearance might be usefully regarded as a vivid last appeal to the enemy's memory, the distinctive nest-appearance being the first—a suggestion as to why the habit of building true to type might have been selected. And the very fragility of eggs must render their need the greater for mnemonic coloration of a particularly memorable kind, and must aid in its effective selection (*cf.* Darwin, *loc. cit.* p. 499).

* This point, with the additional counteragents suggested in a previous footnote, the view that any variation in the direction either of variability or conspicuousness will survive provided a probable counteragent is forthcoming, and the influence of cuckoos towards both distinctiveness and (especially) polymorphism in the eggs of their hosts may seem to some to constitute, without nauseousness, a sufficient explanation of the coloration of eggs. Actually, all this fails to account completely for the facts.

It will not follow that equally conspicuous eggs are equally nauseous, or *vice versa*. A good counteragent might enable the highest conspicuousness to be selected in a but slightly deterrent egg, while a far more deterrent egg without other counteragents, yet insufficiently deterrent to make up entirely for their absence, might have to be to some extent concealingly coloured.

4. *Colour-groups*.—In spite of much general diversity, we find that a number of the eggs of a given area tend to fall into definite colour-groups. If the suggestion that nauseousness is present in eggs be correct, it is possible that occasionally a colour-group may be to an appreciable extent in the nature of such a mimetic association as I have defined above. The model for one such association (white with pink spots, occurring mainly in holes and domed nests) might be in Europe the eggs of the Tits. My mongoose showed a dislike for those of *Parus major*. The model for another group, which also figures strongly in holes, might conceivably be provided by the eggs of Picarian birds, most of which are white and are laid in holes. I have no actual evidence here, except for the eggs of *Colius striatus*, placed low by my rat. Adult Woodpeckers of three genera were placed very low by my animals*.

The fact that white eggs in holes are a *strong* group might be accounted for sufficiently by the fact that some powerful families that tend to lay white eggs whether they nest in holes or not (as Picarian birds and Owls) do, actually, lay most often in them. Omit such cases (in which whiteness is probably now mainly a matter of affinity, though the laying in holes may have been, in its origin, either a cause or a result of the whiteness and synapomorphic advantage may also sometimes now be present) and relatively little is left to account for. Mimicry may partly account for the white of some of the unrelated members of the group, and an additional explanation for the colouring of

* That a Woodpecker possesses fighting-weight must not, however, be overlooked. Mr. Wallis mentions the case of a squirrel found dead by a friend of his in a Woodpecker's hole, with its skull split.

the models could be found (if necessary) in the suitability of white as a warning colour for dark places. It is the warning colour *par excellence* of night-flying Lepidoptera. And Mr. Pycraft has suggested that white in holes, for the same reason of visibility, is useful for the avoidance of accidental breakage by parents*, and, it might be added, by other animals sheltering in burrows. Last, and not least, we may add to these various possible contributing factors (as an alternative or crown to variability) the loss of pigment when it becomes useless and unselected, as in an egg that is now inaccessible (through position or an effective guard) or in darkness.

5. *A Reservation*.—The possibility of mimicry in eggs must be treated with caution, as pure coincidence in their coloration is so general a phenomenon. As I said at the meeting: “The coloration and pattern of eggs is so simple as to lead us to expect the same scheme of colouring to crop up over and over again quite independently of advantage. I have lately been working at eggs in the British Museum and at Tring, and nothing has struck me more than the fact that this continually occurs—very often, it is true, obviously through affinity, but very often again not. And this state of affairs warns us to be very wary about attributing a given resemblance to mimicry.”

In support of this warning, I specially exhibited several African eggs that in appearance are indistinguishable from certain unrelated English eggs. It matters little whether we call such accidental resemblance “coincidence” or the result of “parallel evolution.”

“At the same time,” I went on, “it is a state of affairs under which mimicry may often have taken place—for what is mimicry, at best, but *selected* coincidence?—and the material for selection, the coincidences, are here abundant. So that if we rigidly confine ourselves to a few highly

* Believed by a speaker at the meeting to have been suggested originally by Seebohm, but Mr. Pycraft tells me that, so far as he is aware (and he has looked up that author), the suggestion originated with himself.

probable cases a study of resemblances in birds' eggs may help us a little to understand their coloration." The two examples actually suggested above are intended rather to illustrate a possibly useful line of contributory explanation than to be regarded as put forward with any real feeling of confidence in their individual validity.

6. *Parasitic Cuckoos' Eggs*.—Mr. Stuart Baker, whose field experience in this matter is probably quite unrivalled, considers that it amply supports the theory of Dr. Baldamus. I have myself, in the past, been somewhat sceptical of the part therein implied to have been played by the foster-parent in eliminating Cuckoos' eggs unlike her own; this is in view of the fact that as a schoolboy I sometimes replaced an egg I required with another of quite different appearance, or even with a rounded stone, and the old bird would go on sitting. Mathews ('Birds of Australia') quotes an instance in which Petrels were found still sitting on their empty nests a week after the removal of the eggs. But, if we regard the tendency to reject suspicious-looking eggs as selection's natural reply to special victimization by Cuckoos, this "readiness to sit on anything" may have meant no more than that the species tested had not been greatly victimized. Under these circumstances, mimicry in Cuckoos' eggs might well, after all, often have been brought about by the action of the host alone. The finding of deserted nests containing a Cuckoo's egg certainly seems to support this view, but the question must still, I think, be asked: "Was it detection of the Cuckoo's egg that caused the desertion?" At any rate, the part played by the foster-parent in the elimination of unconvincing substitutes can be very easily tested by experimentation on wild birds.

In any case, whenever the foster-parents' eggs were more or less low-grade, the discriminative action of enemies might well *also* have come into play, and have contributed to the selection of the resemblance. An egg, little known (or known to be pleasanter), and unlike the others in the nest, would be quite liable to special testing even where these

were known and unacceptable—unless, indeed, it resembled some other well-known egg that was then unacceptable. It is just interesting in this connection to recall the fact that the eggs of the English Cuckoo, even when laid in other nests, most commonly resemble the eggs of Wagtails, Pipits, and some Warblers, and to note that the eggs of Wagtails, Pipits, and, at any rate, some Warblers were not placed very high by my animals, the Pied Wagtail's in particular—not that my mongoose's preferences were necessarily the same as those of English egg-eaters.

7. *Polymorphic Eggs of Weavers*.—I refer especially to members of the genus *Hyphantornis*. Each species lays several different types of egg. The types are well marked and constant, and intermediate forms are relatively rare. Apparently each hen-bird lays only one type. Nearly every form resembles more or less strongly some type of unrelated egg occurring commonly in the same area. The figures in Plate XIX. illustrate this point.

Mr. G. L. Bates's suggestion ('Ibis,' Oct. 1911, p. 585) that the distinct types of eggs "must aid each hen-bird in finding her own, to the benefit of the race," might account for the distinct types, but not for the resemblances. In any case, we meet with a similar phenomenon in the eggs of many solitarily-nesting Warblers (*Apalis*, *Cisticola*, *Prinia*, etc.) to which the suggestion could not apply. I may, of course, be unintentionally exaggerating the resemblances. I think not. And, if not, I am rather tempted to think that we may have here a case of polymorphic mimicry such as occurs in insects in the females of *Papilio dardanus*, though probably with a few larger synaposematic elements in the mimicry.

There is a good deal to be said for the view. I will hold this over till a future occasion, when I hope to discuss the whole problem in some detail. There are also two or three quite strong objections to it—resemblances less good or absent in at least one of the species (and in the Warblers), darkness of some of the nests, characteristic appearance of the nests,

a good differentiating character: my view that distinctiveness in nests generally is quite largely for recognition by enemies, is at first sight in contradiction with the suggestion of mimicry between eggs in unlike nests. I showed at the B. O. C. meeting that these objections are not insuperable. Either synaposematism or the view that the nest-appearance is only a first line of defence, and the egg-coloration a last resort, will meet the third of them; while it is not necessary to suppose that polymorphism even here is purely or in its origin a matter of mimicry, or that the mimicry when it arose was necessarily at first perfect.

8. *Darkness of certain nests*, which nevertheless contain coloured eggs, is an objection to any view that regards the coloration of eggs as a visual appeal. I judge from my own special observations, however, that the darkness is seldom absolute; and it must be remembered that an enemy, unable to digest certain eggs or disliking their taste, and relying on sight for their recognition, may even try not to block out all light. So far as nestlings' mouths are concerned, these are usually at once directed, on craning neck, towards or *through* the opening. This is true even of birds that have the opening in their nests below.

9. *Recognition by scent an objection*.—I have constantly known mammals (including my eaters of eggs) that rely very much on scent for recognition, satisfied with mere appearance, and deterred thereby from smelling. It would even seem to be the *rule*, once the appearance has been well learnt and while it is well remembered, and the smelling of such eggs that occurred in my experiments was often the result of pressure on my part. I have even known such animals mistrust the evidence of their noses when it seemed to conflict with that of their eyes, though this is probably quite unusual. There can be no doubt that they must be regarded as a serious factor in the matter of coloration, even when we have excluded all that are exclusively nocturnal, and allowed for the fact that the olfactory appeal will often succeed where the visual appeal has failed. At the same time I regard it as one of the stronger objections

to the experiments I am about to describe that they were confined to animals that rely greatly on scent, and are, therefore, a less important potential factor in the selection of recognition-coloration than are animals that have to rely on sight alone.

I might say in conclusion that I have already, in the course of my work, had to throw aside or modify so many tentative explanations for various facts, that I fully expect that much that I have written in this paper will yet meet the same fate at my own hands or that of my critics. Theories are the stepping-stones to knowledge. But not when we refuse to leave them behind us. I shall consider my present suggestions to have amply served their turn if, discarded themselves, they should nevertheless have resulted in an awakened and resultful interest in the explanation of two of the most fascinating and neglected of colour-problems.

SOME FURTHER OBSERVATIONS AND REFLECTIONS.

Since I wrote the above paper I have had a limited opportunity for further observation and experiment. I will touch briefly on a few of the more interesting results, reserving a fuller account for a future occasion.

The selective factors in the matter of Cuckoos' eggs.—I have placed eggs not their own in the nests of a number of birds and watched the result. The first three or four, although contrasting strongly with the bird's own eggs, were accepted, and I expected a repetition of what I remembered as my boyish experience. Subsequently, though many acceptances still occurred, the majority of the changelings were rejected, and Prof. Newton's explanation of the facts with regard to the eggs of the English Cuckoo—"That certain kinds of birds resent interference with their nests much less than others . . . but with other species it may be, nay, doubtless it is, different"—was supported. I am delighted to have obtained so unequivocal a result in favour of Mr. Stuart Baker's view on a point on which I was inclined to differ from him; and I am glad to have indicated, at my own

expense, the value of definite experiment as against uncontrolled stray observation. Above all it has been fascinating again to watch natural selection at work.

The result by no means affects the general explanation of the distinctive element in the coloration of eggs as being for recognition by enemies, unless it should be considered that parasitism was once so rampant that distinctive coloration had to be developed in order to enable parents to distinguish their own eggs from those of Cuckoos that were following them up in the matter of coloration. This would be an alternative, if not very probable, explanation, and it may certainly have acted as an important contributory factor in a number of cases—in some of them towards the selection of high distinctiveness, in others towards polymorphism (as in Warblers and Weavers). Polymorphism in the host's eggs would certainly reduce the individual Cuckoo's chances of matching its egg, if (as seems likely) its choice is based on recognition of foster parent and nest; and I do not know at present that polymorphism occurs in this definite form outside of the birds that Cuckoos victimize. The variability of the Guillemot's egg is rather a different thing, and will doubtless be found to possess a special explanation of its own. The explanation of the resemblances remains unaffected.

Nor is the view that the attacks of enemies may have contributed to mimicry in Cuckoo's eggs disproved, though it is certainly rendered unnecessary and, at best, secondary. Where the difference between the eggs exchanged was slight no rejection took place, but I do not lay stress on this. A case I shall refer to below suggests that further experiment might have produced occasional cases of finer selection.

“*Darkness of the nests*” argument.—In the above-mentioned experiments *Hyphantornis jamesoni* regularly ejected eggs not its own, and a *Sitagra ocellaria* an egg of *Hyphantornis nigriceps* of the spotted blue type. Still, neither's nest can be regarded as dark. But the *H. nigriceps* also ejected the *Sitagra* egg that was used in the above exchange. This is highly important, for this *Hyphantornis* builds, at

Chirinda, the darkest weaver nest I know—really very dark ; and not only was there little difference in size, shape, and feel between the eggs, but there was also no great contrast in their coloration.

Mr. Bates's suggestion that the different forms of Weaver's eggs are for recognition by the parents.—In three cases I made a complete exchange of eggs between contiguous nests. In each case, instead of exchanging nests, the birds deserted. I have also, both now and in the past, noticed excitement on the part of a particular bird or pair of birds as I have tackled each particular nest, showing that the birds know their nests even at a little distance by their position, etc. More observation is wanted nevertheless, especially of all the causes of the squabbles that take place in a large Weaver colony.

Unpleasantness in eggs and nestlings *.—I have commenced to experiment on myself with eggs, and I can already confirm to some extent Mrs. Selater's and Mr. Wallis's statements as to their different tastes : their different "strengths" would be almost better. It is wonderful, nevertheless, how similar the most unrelated eggs may be in taste, and the differences I have noticed up to the present are merely comparable to, yet greater than, those that obtain as between different genera of Nymphaline butterflies which are nevertheless divided up into numerous grades by their enemies. However, I have not yet tried any eggs that were placed at all low by my animals. I have also found, I think, that some eggs are more or less nauseating when swallowed, while others are not : not that what nauseates myself will necessarily nauseate a Crow. In any case the experiments have not yet proceeded far. I am waiting for a bird of the Crow family in order to continue my main experiments.

I have added slightly to the list of nestlings disliked by my cat, and have noticed in three of them the unpleasant smell described by Mandina in a conversation I have quoted above. The worst was that of *Bycanistes cristatus*—so

* Yet further testings enable me to confirm Mr. Wallis more completely.

pungent and nauseating that we had to banish the young birds from the verandah. The cat refused one when hungry, though he eats the full-grown bird practically to repletion; but the smell may, of course, disappear with death.

Nestling distinctiveness in relation to recognition by parents.—I have referred in footnotes to my experiments in this connection. That the distinctive element in the call-notes of nestlings *may* be of use to parents has struck me lately in thinking over the numerous escapes of young birds that, as I have myself seen in relation to snakes, occur through their fluttering down from the nest. Their calls certainly take their parents to them (as I have often seen), while those of another species presumably would not; yet, to account for the selection of distinctiveness in this connection, one would have to imagine that it is a common occurrence for nestlings of more than one species to be out of their nests together. The solicitude shown by the parents for these strayed nestlings (and for caged nestlings) makes one wonder at their alleged ready desertion of those that are ejected by Cuckoos.

Resemblance between mouths of Cuckoo and foster-parent's nestlings; ejection of fellow-nestlings.—A very young Cuckoo nestling in a Bishop-bird's nest had the mouth a rather dusky orange, and different, therefore, from the rose-coloured mouth of its surviving fellow-nestling. This, and doubtless numerous other cases, must stand against my suggestion made early in this paper. At the same time the orange was turning to salmon (especially under excitement) before the bird's death, a few days later. A fledged Didric Cuckoo, now in my possession, had a glorious mouth when taken from the nest of its *Hyphantornis* foster-parents—an exaggerated weaver-red, with the pale portions corresponding with those of a weaver's mouth. A rush of blood reinforces the pigment, for when the mouth was forcibly opened it was paler, and showed a tell-tale Picarian tongue. Both the Cuckoos had the Weaver's note, "tsip, tsip," and even more than the usual *Hyphantornis* head-waggle. It would be interesting to know whether these characteristics

are also possessed (as they may be) by Cuckoos that victimize chiefly other birds than Weavers.

The younger Cuckoo (I have not identified it) gave me demonstration after demonstration of the gentle art of evicting fellow-boarders of various kinds from even quite deep nests, and, incidentally, of the use of the highly prehensile feet in preventing himself from following them (as he invariably did when he pushed them from the smooth surface of my hand). The act of eviction is not a simple hoist. There are many co-ordinated movements and an exhibition of tenacity that may continue for ten minutes or more, and that, through all the rests and demands for food that punctuate a difficult operation, refuses, like a ratchet-worked stump-lifter, to yield one millimetre of height gained. The case is of much interest for its bearing on the question of the origin of adaptations. It is impossible to believe that the habit in its present complexity arose as a single variation. If it did not, it is just as impossible to believe that in its early stages it could have been selected—at any rate in the newly-hatched bird; for a miss is in this matter as good as a mile, and there would have been nothing at all but misses. One must invoke either the Lamarckian explanation pure and simple, or (2) the supposition that the habit was first selected in flat nests only (and this is insufficient), or (3) suppose that it arose and was first selected in nearly full-fledged birds and has passed back into an earlier stage in development, being gradually perfected as it did so—an interesting possible instance of the origin of an instinct from, probably, a partly deliberate act. My present Cuckoo was *farouche* in every sense of the word when I took it, full-fledged, from the nest. It threatened and attacked myself with mouth displayed after the manner of an adult at bay. It tolerated companions in the nest only so long as they remained still. When they fidgeted or began to climb on to itself it did not, like the younger Cuckoo, push under them, drop its head, extend its legs, procure successive purchases for its feet, and purposefully heave and hoist; but it showed irritability and sharply pushed or buffeted

them with its wings, and it may be that it was in some simple action like this that, as I have suggested, the whole instinct and action of ejection originated. I will discuss the experiments more fully in a more appropriate place.

Are Tongue-spots a Nestling Adaptation?—I secured two nestlings of *Dryoscopus guttatus*, so fully fledged that the male flew from the nest on my approach and was only captured with a little difficulty. They still had the perfectly plain orange-yellow mouth. Nearly three weeks later, when they were well able to fly, they were commencing to show the twin spots, and a fortnight later those of the male were very pronounced, the mouths being otherwise still orange-yellow. A fortnight or so later, the female was at the stage then reached by the male, with a mouth equivalent to the nestling mouth of, say, *Prinia mystacea* or *Laniarius sulphureipectus*. The male had advanced further, through a stage which one often finds represented in nestlings of *Cisticola natalensis*—tongue and inside of mouth flesh-coloured, submarginal parts still yellow—through an all-pink stage (with twin spots) that occurs in other nestlings of the same *Cisticola*, as well as in other warblers, and that, without the twin spots, would be like the adult mouth of *Lanius collaris*, to a stage in which an incipient darkening of the apical portions of the mandibles produces a resemblance to the mouth of several adult birds—*Batis molitor* and *B. erythrophthalma*, *Graucalus pectoralis* and *cæsius*, *Podiceps capensis*, etc. The final stage, as we know, will be all black.

Of course it may be argued that if the twin spots were the last dark colour to disappear, they may be the first to appear again with the re-darkening of the mouth, and that, though a nestling adaptation, they have had in this instance to give way for a time to a pattern which, under the species' present circumstances, offers it greater advantages—perhaps enabling the young to be mentally associated by enemies with those of *Lanius collaris*, which the female *Dryoscopus* nestling rather strongly resembled. Much further work is needed, including observation of embryonic tongues within

a day or two of hatching. Meanwhile, I will perhaps not be blamed too greatly for provisionally placing this mouth and that of *Cisticola erythrops* amongst the arguments against the nestling-adaptation view. I may add that an unhatched *Prinia* had the spots quite separate and unconnected—which leads one to enquire whether the tongues shown in my text-figure were not perhaps specially advanced rather than reversionary—and that a younger embryo of *Heliolais*, the mother of which had not lost the twin spots, had its mouth already tinged with yellow, but (so far as I could see) no spots. Those *Prinia* embryos nearly as advanced showed no spots, but I am not sure that they were yet beginning to show any pigmentation at all.

I have already, in a footnote, referred to the fact that the substitution of a nestling with a spotless mouth for one possessing the twin spots strongly developed, did not to all appearance result in any detriment to the former or in trouble to the latter's parent. I have also specially tested the rest of Mr. Pycraft's view, that mouth-spots "occur just in those areas where the mouth is most sensitive to touch, so that they serve a double purpose—they form a guide to the parent, and ensure a mechanical closing of the mouth directly the right stimulus, given by the touch of solid food, is administered." Mr. Pycraft applies this view even to nestlings "hatched in open nests, on the ground, amid short grass," believing that the spots "were probably developed before the birds adopted this more open nesting-site; and, this being so, . . . they are still needed to serve as a cue, so to speak, to the right co-ordination of movements necessary for the sure transference of food to its destination."

The view may quite likely apply in its entirety to cases I have not tested. I have experimented on very many nestlings, however, mostly with the twin-spot tongue and in covered nests, with the following general result:—(1) the apical portions of the mouth, including the tip of the tongue, are less sensitive than the inner portions. Mouth-spots occur in both areas. (2) Of the more sensitive parts,

the back of the tongue and the palate both quite commonly failed to respond to stimuli that tickled my face, but were not felt between my knuckles. Yet the same stimulus applied to the gullet (the tongue not being touched) often led to swallowing. (3) The back of the tongue often failed to respond to faintly stronger stimuli that produced swallowing if applied to the palate. This was noted in *Prinia* and three species of *Cisticola*, and verified by experiment after experiment. Sometimes a light object was left lying on the spots, or a small grasshopper tegmen, or piece of chitinous flesh was rubbed back and forth on them, yet failed to produce swallowing till it touched the palate—which was spotless. Conversely, the most sensitive tongues I tested were some of *Pyromelana*—which are spotless. (4) My general experience of parent-birds has been that they push the food well into the mouth, and do not merely lay it on the lower mandible, where the base of the twin-spot tongue often lies, pushed forward, when the nestling is asking for food. But I have to make a larger number of special observations before I can suggest that this is invariably the case. (5) The nestlings used were of all ages, from an individual that I took alive from the egg to practically full-fledged birds, and I also used in each case the bills of adult birds of the species. The points of these practically filled the mouths of very young nestlings and gave a simultaneous stimulus at several points. When the nestlings were older, the bill still commonly touched both palate and tongue, and led to swallowing even when inserted beside the tongue, the nestling merely turning its head slightly in that direction. And the bill-point is smaller than numerous objects of food that I have watched the parent-birds push into the mouths of their young.

Altogether, with the best will in the world, I was quite unable to discover any possible use for the spots in relation to the parent-bird, though observation may yet, I suppose, reveal one.

With the flange- and palatal-markings of the Estrildinæ it is quite likely different. The spotted tongues and palates

do not seem specially sensitive, and one has sometimes to push the food well down into the throat to get it swallowed, but the markings are probably in part directive nevertheless. The nests are sometimes distinctly dark, and placing one's eye to the opening one often sees only the brilliantly white stars at the corners of the closed mouths. That these are useful to the parents is likely enough from the fact that the young nestlings especially do not necessarily open their mouths on the nests being touched, but do so at once in reaction to a sharp little touch to the bill between the white stars; and the mouth when opened is yet more clearly indicated by the white flanges. I have seldom myself been able to make out the inner black markings from this position, but it must be different for the bird that has actually entered the nest. In nestlings that I have held in obscurity equivalent (as I judged) to that of the nest, some of the black markings have formed to the eye, a dotted circle surrounding, and to that extent indicating, the gullet; this may, of course, be their function, though one would have thought the vastly more conspicuous white flanges a quite sufficient indication. In *Spermestes poensis*, figured by Bates on p. 590 of 'The Ibis' for October 1911, the encircling black-dotted line is replaced by a nearly unbroken *white* circle, which certainly seems as though it must be directive. That this is not the whole explanation, at any rate for *Estrilda*, is suggested by the fact that some of the spots by no means come into the "directive" circle, though they certainly contribute to the distinctive appearance of the mouth, and that the circle must, in any case, be dim, except to an enemy that has opened the nest; and by the extraordinary eye-like form taken by the flange-markings in that genus. The opened mouths look like a series of most vicious little demoniac faces, not bird-like at all, with glaring eyes and rows of white teeth. An intimidating element is quite likely present, but "hissing" does not correctly describe the extraordinary, rapid, and continuous click-clacking of the young birds. A final point of great possible interest is the fact that the tongue is

sometimes held upraised so as to show its under-surface and the portion of the lower mandible that in other birds is concealed by the tongue. This gives scope for markings under the tongue, and that these in some cases exist is shown by Mr. Bates's remarks on *Spermestes poensis*. It is probably quite a nice instance of the exception that proves the rule, for in birds' mouths generally, with the under-surface of the tongue concealed, there is a lack there, not only of spots, but of pigmentation generally, just as there is on the extreme under-surface of the whole nestling of *Centropus burchelli*, and on the little-shown under-surfaces of many reptiles, small mammals, and arthropods, and this through no consideration of counter-shading. The confinement of mimicry to seen surfaces (*e. g.* in *Dismorphia*) is exactly similar, and from the facts generally it can be fairly argued that not only the spots, but the pigmentation generally, of the mouths of birds must be for visual effect. It can be argued from the same facts that whether we regard the variations on which the coloration of mouths is originally based as mutations or fluctuations, they can hardly have been large. Strong pigmentation and spots would be harmless under the tongue even if useless, and were these to arise at all frequently by large and sudden variation, we might expect to see them fairly frequently in that position, just as the pigmentation of *Dismorphia* might have been expected not to stop short exactly at the unseen surface if the resemblance had arisen at a leap. Incidentally, the above and other facts connected with the coloration of birds' mouths (*e. g.*, the similarity between the breeding and non-breeding mouths of male *Pyromelana*, in spite of the extraordinary difference in plumage) warn us, at any rate, not to place too implicit a trust in explanations based on correlation. It is also worth while adding that the changes in the mouths are very slow and gradual.

SOME LATER CRITICISMS ANSWERED.

I have lately received the following criticism:—"Among insects a close inter-resemblance between individuals is overwhelmingly the rule, whereas in birds' eggs, where

markings do occur, they are most notably unstable, not only in the same species but in the same nest."

That the objection sounds more formidable than it really is, we may realize at once by remembering how readily, cases of close resemblance apart, we ourselves differentiate by their appearance, most eggs that we know in a given locality. A local collection in which the eggs of each species were so numerous as not to give undeserved prominence to relatively infrequent variations, some of these inseparable from a mode of pigment-deposition that is sensitive to fright, ill-health, &c., would show the same. A very great deal of variability would remain, but certain considerations must be borne in mind:—

(1) Insects are recognized by a definite pattern, eggs by an indefinite one, by the *general effect*. The principle is more suitable for a rollable object which has to convey sufficiently the same visual impression, whichever side is uppermost, and it is probably correlated also with the mode of deposition of the pigment. This very indefiniteness, while it detracts (necessarily) in no way from ease of recognition, gives a far greater latitude to unimportant variation (even as between two sides of the same egg) and quite likely, by the attitude of mind engendered in an enemy, also paves the way for the survival in certain cases, without too great loss, of variation that is somewhat greater.

(2) The very fact that variation often occurs within the clutch will be of advantage to a variable species, by acquainting an enemy with the specific range of variation at a minimum of loss.

(3) A number of insects also, and some insect-groups, are very highly variable, though the variability is often easily explicable on selectionist lines. Even if eggs are much more commonly variable, this merely means more cases to be explained. It is very possible that the explanations will in no way conflict with the theory. It is even possible that important factors may operate in relation to eggs which are not present in the case of insects at all.

(4) Great as may be the variability of eggs, it is never-

theless well to be clear about it. I find that of the Passerine eggs with markings that I am best acquainted with at Chirinda, about 15 per cent. show considerable variability, led by *Pycnonotus layardi*, while 26 per cent. are polymorphic in a more definite way, each possessing two or more forms that are in themselves very constant and between which intermediates rarely occur. The remaining 59 per cent. are really very uniform, apart from rare variations. It must be remembered, too, that even in highly variable eggs there is, in many cases, a common form; also that monochrome eggs are very numerous and seldom very variable. The percentage of variable species will doubtless be higher in some localities and lower in others.

The criticism is a very important one, nevertheless, and I will deal further with variability below.

One might easily go on criticizing. Thus, it might be suggested that it is only in species that do not sit till the clutch is laid, and then only during the first few days, that the matter of egg-coloration will be of importance in relation to enemies; after that it is the parents' coloration that will count. But some parents leave their eggs readily on the approach of an enemy, while others are easily driven off from their nests, and the distinctive element in egg-coloration is, in many cases, only regarded as a last line of defence. The objection is as though one should say that the brilliant displays of many insects when finally at bay are not mnemonic, because at all other times the bright surfaces are concealed by dull-coloured tegmina, &c. It might also be suggested, as a criticism, that egg-eaters will sometimes obtain too few eggs to eliminate the indiscriminate craving already referred to. The objection is again a limited one. Or again, that I probably so surfeited my animals with fowls' eggs that what appeared to be preferences were based only on degree of resemblance, in smell or taste, to the eggs of *Gallus domesticus*. Plausible for the mongoose, the criticism is inapplicable to the rat and lemur, and in any case, it admits a basis of preference. Still, the

lemur's preferences are relatively unimportant, and the rat's might be explained (with a little inconsistency) as having been, very naturally, for those eggs that he was most accustomed to receive. And so on. And yet it is interesting, and in harmony with the theory, that eggs which possess for their first line of defence relative inaccessibility, and particularly *Sitagra*'s with the long-necked nest, should have been placed quite high by both animals, while amongst the eggs least liked by each, were some that are very accessible in nature, as those of *Macronyx* (and often *Pycnonotus*, &c.) to the rat, and *Pycnonotus* to the lemur. What is really required, of course, whether for or against the theory, is careful and critical field-observation on the lines of the excellent work of some of our well-known bird-watchers of to-day.

Variability.—Variation in eggs is sometimes local. Thus *Sitagra ocularia* lays only grey-spotted eggs at Chirinda, but red-spotted eggs in some other South African localities. West African Weavers lay some form of eggs that do not seem to figure amongst the eggs of their South African representatives (not that this is necessarily purely a geographical matter), and I was interested lately to see that the forms of *Prinia mystacea*'s egg that are rarest at Chirinda are apparently common in British East Africa. Instances could be added from the Catalogue of Eggs.

Variation in the same locality is mainly of two kinds:—(1) definite, as already described for the eggs of many Warblers and Weavers; (2) indefinite. Selectionist explanation would also be of two kinds. Variability may have been selected because useful and necessary; or (2) it may merely have been tolerated as harmless, through a slackening of the factors that make for uniformity.

Definite selection factors making for variability might be the need for the baffling of Cuckoos (possibly an important and somewhat widespread factor), the need for differentiation by parents of their own eggs from those of their neighbours, and procryptic adaptation in varying directions. The existence of the second necessity is doubtful in the case

of the Weavers, and the apparent view of observers that gregariously-breeding sea-birds also recognize their nests by position, with the indirect evidence perhaps supplied by the fact that eggs of the Common Guillemot of the same coloration would seem to have been found in exactly the same spot in successive years, tells against it even here. Extensive experimental transposition of eggs will quickly settle the question.

The question, of course, presents itself: Are these necessities, then, of greater importance than that of ready recognition by enemies? Probably, where nauseousness exists, they are not, but in any case it is rare, I think, to find that where two necessities conflict one merely prevails over the other. Both have to be adequately dealt with, and usually counteragents are found to be present, by means of which one necessity is reduced or both fully met. In the cases under discussion both these methods seem to be in operation. Thus the absence of nauseousness, the fighting qualities of the Drongo and certain other conditions probably act as "reducing" counteragents in the way I shall suggest below, while in some of the Weavers the "enemy" demands are themselves, I believe, boldly met by mimicry, engrafted on to a polymorphism that may have been primarily selected in relation to the baffling of Cuckoos. Again, even if it originated in a common ancestry, the fact that the polymorphic eggs of different species of Weavers and (at any rate at Chirinda) of different genera of Warblers, tend to run to similar forms in the same locality, ensures an ample population and an ample resulting notoriety for each form in relation to enemies, while each *species* still enjoys the full advantage given it by polymorphism in relation to Cuckoos and (if that be a necessity) to parental recognition. At the very worst (if the Cuckoo does try to match her egg—which at present seems unlikely—and is the better enabled to do so through the larger population of each form) the risk is divided up between two or more species. I may mention, finally, the constancy (in my own limited experience) of the non-mimetic forms of polymorphic eggs, amounting in some

cases to that special constancy which one would rather expect to be necessary as a counteragent to the results of any serious diminution of the colour-population. The explanation offered is not incompatible with the view that the phenomenon may be Mendelian. Rather, it perhaps enables us to picture how the necessary basis in heredity for the production of Mendelian results might sometimes have been brought about indirectly by selection elimination.

As for slackness of selection in relation to recognition characters, several things might bring about such a condition. An egg that through the present-day specialization of its enemies or its own loss of nauseousness had become completely acceptable to the former could gain no further advantage from recognition and might vary unchecked. The explanation should be particularly applicable to eggs, for these do not possess those other defences, often slight, yet deterrent to attack by weaker or more replete enemies, of known agility, wings troublesome to remove, chitin a trouble to break up completely, and so on, that are commonly present in the highest-grade insects (except, especially, various geometrid larvæ, themselves often highly variable) and that, as I have actually seen, render easy recognition still useful to them.

Again, there is the case (already suggested) of the bird that has taken to nesting year after year in the same spot in great open colonies. Its enemies would no longer consist of chance passers-by and searchers. On the contrary, the existence of the colony would have become a matter of notoriety and attraction to every enemy in the neighbourhood and far around. Such an enemy would visit the nesting-places whenever it felt hungry enough for a feed of the eggs, the qualities of which it would know well. It would recognise them, not by their coloration, but by their mere presence in the colony, and variation in coloration might once more ensue unchecked. Even if another species with eggs of a different grade should lay in the same colony, the difference in size or shape or texture or general type of

coloration would probably be a sufficient differentiating character.

Merely at first sight it seems corroborative of this explanation that the British sea-birds that form the greatest nesting-colonies—the Common Guillemot, the Kittiwake, and the Black-headed, the Lesser Black-backed, and the Herring Gulls—lay very variable eggs, while the apparently less highly gregarious (or less abundant) Black Guillemot and Common Gull, and the still less gregariously-breeding Great Black-backed Gull, lay eggs that are in the first two cases comparatively, in the third rather markedly, uniform. But there are, of course, numerous other species even of the genus *Larus* to be considered—some laying variable, some uniform eggs, to say nothing of a Tern, *Geochelidon anglica*, that lays variable eggs in South America, but relatively uniform eggs in the north (Cat. Eggs B. M. i. p. 177). Naturally there will often, if not always, be other and complicating factors to be taken into account. That some other species that lay in colonies, as Penguins and Petrels, should lay eggs nearly or quite devoid of pigmentation, is, however, no objection to the view, for loss of pigment might be regarded as an alternative or eventual development when its presence no longer subserves the purpose either of recognition or of concealment*.

Once again, an egg that had become relatively inaccessible to enemies, whether as a simple matter of nesting-site or through the development of pugnacity or fighting-weight in its parents, might similarly not have the same need as formerly for a highly distinctive appearance. In a case of this kind loss of pigment might again be an alternative or eventual development, for there would also be less to fear

* This view may be applicable to many more white eggs than those here mentioned. It has seemed to me, as to Mr. Pycraft, that definite selection must have been at work to produce quite the appearance of, *e. g.*, the eggs of Woodpeckers, the strong distinctive element that appears to me to be present in such eggs pointing to that conclusion; but, obviously, only definite experiment can show whether either of us is correct in his view.

from detection. The Hawks lay very variable eggs; some few of them regularly lay white eggs, and white is not an unusual variation even amongst those species that do not. Still, we have here yet another possible counteragent to variability, a limited one, in the general family resemblance that runs through the many variations. One finds the same thing in the *Acræinæ*, a subfamily of variable butterflies, and hence it was undoubtedly sometimes of use in preventing attack by the birds on which I have experimented. The Fieldfare, a very "fightable" bird (*Wallis*), and one that tends also to nest in colonies, lays rather specially variable eggs, and so do those notorious warriors the Drongos, though here, again, an alternative or supplementary explanation is possible: for in some Drongos, perhaps in all, the variability is of the more definite kind that I am disposed to attribute rather specially to active selection and may perhaps have been in part selected in relation to Cuckoos*.

Finally, there is the probable factor of abundance in a species. It is obvious, I think, that an enemy may become acquainted and remain acquainted with a considerable range of variation in a highly abundant species with, actually and proportionately, a far smaller loss to the latter than would fall to the lot of a scarce species, and that, other things being equal, the selection will be less severe, and the consequent permission to vary greater, for an abundant species than for a scarce one. Certainly most of the more highly-variable species I am acquainted with are also common.

* An objection to this explanation for polymorphism would be that many species in the eggs of which it occurs do not need it for protection from Cuckoos, seeing that none of their eggs are matched by that of any local Cuckoo. It must be remembered, however, that the explanation is only regarded as one of several; that in some cases, too, the form resembled by a Cuckoo may have died out; that other cases may represent a Cuckoo defeated and forced to follow other channels, especially if Cuckoos' eggs should possess the relatively ready adaptability that would seem to be possessed by members of mimetic genera in butterflies, and that, in any case, even a quite distant resemblance should be taken into account, seeing that I found in my experiments that such a resemblance usually sufficed to secure adoption.

At the same time, neither this rule nor any other that I have suggested can be expected to be universal, for other considerations very often are by no means equal. A species that has relatively recently begun to encounter either a more rigid selection or a slackening of selection, is unlikely to show the effects of the change so strongly as a species that has been subjected to these conditions even in a somewhat slighter degree for a far longer period. But degree should be important too. Selection, again, immense as must be its importance as the regulative factor in evolution, is by no means the only thing to be considered. Environment may frequently impose a variability on a species that the latter will only be able to counteract, if at all, by the adoption or accentuation of some defence perhaps quite other than anything suggested above. In such a case as the Fieldfare's (always supposing it to be valid) the additional "fightability" may have been the result of the imposed variability, not this of the other: though in few cases of this kind is it really possible to say which is the cause and which effect, or to do other than suppose that both developed together, reacting on each other.

Great caution is obviously necessary in the interpretation of particular cases. Thus my quotation (above) from Mr. Wallis, which gives Fieldfare, Missel-Thrush, Blackbird, and Song-Thrush as the order of "fightability" for these four birds, is just spoilt as a suggestion of the effect of graded fightability by the fact that the order of variability transposes Missel-Thrush and Blackbird. Either, therefore, relative fightability has nothing to do with relative variability in the four species mentioned, or complicating factors must also be taken into account—as no doubt they must in any and every case. Again, one would have been tempted to suggest the House-Sparrow's egg as an instance of variability resulting from relative inaccessibility, owing to the bird's attachment to human dwellings, were it not for the knowledge that wilderness-inhabiting members of the genus (as *P. arcuatus*) also lay very variable eggs. Every case will

have to be explained with a very full knowledge of the egg's defences, and of the habits of its parents and its enemies ; but I have said enough, I think, to suggest that, if and when the evidence for the existence of preferences in the enemies of eggs becomes conclusive, so far from finding variability a stumbling-block we shall begin to find it reasonably explained.

THE EXPERIMENTS.

Method of Deduction.—If species A was eaten immediately after B's refusal, A was regarded as probably preferred to B. If, however, another acceptance, C, had intervened between B's refusal and A's acceptance, A could not be regarded as necessarily preferred to B. Its acceptance might have been (and often certainly was) the result of a special stimulation of the digestive secretions by C—a stimulation which might even lead to B's acceptance now if reoffered. Depression of the appetite by an unwelcome offering also occurred, and its possibility has to be allowed for, but it was less frequent and less marked than stimulation. Insufficiency of a particular class of prey in the animal's diet before and during the period of experimentation had also to be noted, as it sometimes led to special craving.

Special complicating factors to be allowed for were these : The lemur was found probably to possess a slight preference for freshly-opened eggs as against eggs of the same species that had stood over, opened from the last experiment—not that these were greatly used. The rat appeared to be quite indifferent to this, but slightly preferred fresh eggs to hard-set ones. To this the lemur seemed indifferent. The mongoose, on the other hand, preferred incubated to fresh, and ate readily (as I ascertained by special experiment) even somewhat highly addled eggs of the species he preferred.

I was unfortunate in one of the conditions under which my experiments on the lemur had to be carried out ; fowls' eggs were scarce at the time, and it was, therefore, more

difficult for me to make eggs a really strong item in the animal's daily food, and so avoid that over-cagerness for them that I have referred to, and that was just possibly responsible for the fact that the lemur's preferences were not, as a rule, shown till somewhat near repletion-point. In my experiments on the mongoose this difficulty was not present, and, whether as a result of this or not, his preferences were very marked and decided. So, as a rule, were those of the rat, an animal which from its smaller size was far more easily supplied with an adequate diet than the lemur. I ought to say that I found later that the lemur preferred several species of Noctuid moths and of birds to any of the insects and fruits used in the following experiments, so that it is barely possible that he was sometimes less replete in these experiments than he appeared.

EXPERIMENTS ON A RAT (*Mus rattus*).

Expt. 1. Feb. 2, 1913.—The rat has been a week in captivity and is accepting freely from the forceps. Of eggs he has been offered and has accepted and eaten readily from the very first those of *Amblyospiza albifrons*, *Hyphantornis jamesoni*, and *Coliuspasser ardens*: probably in sufficient numbers to ensure the absence of any undue craving.

Late this morning, having purposely kept him without food since last night, I fed him a very little to avoid acceptances being the result of sheer starvation. He then readily ate a fresh egg each of *Amblyospiza albifrons* and *Coliuspasser ardens*, tasted well and rejected a rather hard-set egg of *Pycnonotus layardi*, and continued to ignore it on my leaving it in the cage, but readily ate a fresh *A. albifrons* egg, repeatedly refused the *Pycnonotus* egg, and smelt and rejected a second of the same species from another clutch, and on my leaving them beside him continued persistently to ignore them. I had to leave, but before doing so added an egg each of *Coliuspasser ardens* and *Amblyospiza albifrons* (each quite as hard-set as the first Bulbul's egg); a Bulbul's egg was left right under the rat's nose.

On my return twenty minutes later the two Ploceid

eggs had been eaten clean out, but the Bulbul's remained untouched and continued so. After waiting a few minutes in vain for further developments, I added a fresh egg of *Colius striatus minor* and withdrew to a distance. I saw the rat turn round and try it, apparently lapping, but quickly turn away again. I went away for five minutes and on my return found the rat's head still averted from the egg and the latter still full. I noticed that a *Hyphantornis* egg (spotted blue type) that I was about to add was probably slightly addled. I put it in with the rest, nevertheless, to see how it would be treated, and beside it a perfectly fresh egg of the same species and form, also a *Colius passer* egg, and again withdrew.

On returning five to ten minutes later I found the addled *Hyphantornis* egg and the *Coly* egg overturned and their contents spilling out over the ground, but the other two eggs had been cleanly licked out. I again waited three or four minutes, and as the rat continued to take no notice of the rejected eggs, I added an egg each of *H. jamesoni* (spotted blue type) and of *Crateropus kirki*, first giving the rat a very small scrap of bread, which he accepted from the forceps and ate with greater eagerness than he had shown for any egg.

Twenty minutes later, finding the two eggs still untouched, I tried to ascertain how far he was from actual repletion-point. He ate three or four small scraps of cold maize-porridge, a fair-sized scrap of bread, a little papaw, and some banana—all readily, especially perhaps the last, and the first least, then refused all.

Preferences shown: (1) Partly incubated eggs of *Amblyospiza albifrons* and *Colius passer ardens*, fresh eggs of the same two species, and a fresh egg of *Hyphantornis jamesoni* (spotted blue form). (2) Partly incubated eggs of *Pycnonotus layardi* and freshly laid *Colius striatus minor* (only fresh *C. ardens* and fresh *H. jamesoni* were tested against the latter, however).

The above rejections and acceptances, and, finally, rejections of spotted blue *Hyphantornis* and *Crateropus kirki*, took

place when the rat was still somewhat far from repletion. The early rejections were very decided.

Expt. 2. Feb. 3.—Morning. Ate a very small scrap of papaw, tasted and rejected and thereafter refused an egg of *P. layardi*, but readily ate that of *A. albifrons*; refused, then ignored most persistently the Bulbul's egg, but readily ate the blue egg of *Crateropus kirki* (I removed it when half finished), and once more ignored for quite five minutes the Bulbul's egg. I added an egg of *H. jamesoni* (spotted blue form) and left.

I returned twenty to twenty-five minutes later to find the Weaver's egg eaten and the Bulbul's still intact, though left under the rat's nose. I had not time to continue the experiment, but left the Bulbul's egg, and on returning considerably later found it two-thirds eaten. Forty minutes later still, judging him to be distinctly hungry, I gave him a very small scrap (barely more than an eighth of an inch each way) of bread and another of papaw, then placed a Canary's egg (*S. icterus*) in the cage. He neglected this at the moment, and apparently ate none of it during an absence on my part of a few minutes. I therefore added a not dissimilarly marked egg of *Cisticola semitorques*. He at once ate this, then picked up the Canary's egg and ate it too. I put in a second Canary egg and this was ignored, as was a Bulbul's (*P. layardi*), which I added a few minutes later. On my adding a little later a *Crateropus* egg, he turned round as though tempted to try it, actually licked it, and turned away again. On my adding a blue *H. jamesoni* egg, he lapped a very little, and turned away and persistently ignored all four eggs, though I waited away for ten or fifteen minutes. I pushed them up to him in turn on my return, held them to his mouth, and generally tried to coax him to eat them; but he seemed in an irritated condition, bit savagely at the forceps and my fingers, and would have nothing to do either with these eggs or with that of *Sitagra ocularis*.

An hour later all remained untouched and the rat in the

same corner. I added eggs of *A. albifrons*, *C. ardens*, *Cisticola semitorques* and *natalensis*, *Macronyx croceus*, *Prinia mystacea*, and *Estrilda astrild*, at the same time removing the *Crateropus* egg and those of *P. layardi* and the Canary, and replacing the blue *Hyphantornis* egg by one of the spotted blue form.

In the early afternoon all still remained uneaten, though the rat ate a scrap of bread with the greatest eagerness.

Preferences shown: (1) *A. albifrons*, *C. kirki*, and *Hyphantornis jamesoni* (spotted blue). (2) *P. layardi*. *C. semitorques* was also probably preferred to both *P. layardi* and *S. icterus*; and, after changing his mind and eating the latter, the rat showed signs of great irritation and refused all eggs, though probably far from repletion. Once more the early rejections were of a very decided character.

Expt. 3. Later experiment (8 P.M.).—Found all eggs eaten, except the hard-set *Macronyx*. The shell of this was much broken, but little or none of the contents seemed missing. I added the Canary's egg. This was persistently ignored. I added the remains of the Bulbul's, now, however, commencing to dry. This was eaten, but the Canary's was still persistently refused. The rat readily ate the remains of the *Crateropus* egg (also drying slightly, but less than the Bulbul's), repeatedly and persistently refused the Canary's, readily ate an egg of *Estrilda astrild*, repeatedly and persistently refused the Canary's, ate readily the blue *Hyphantornis* egg, repeatedly and persistently refused the Canary's, ate readily one each of *P. mystacea* and of *Cisticola subruficapilla* (finely speckled), refused persistently a second Canary's egg of the same clutch (the first had just been given to the lemur), ate readily a *C. semitorques* egg (blotched); tasted the second Canary egg on my bringing it again to his notice and rejected it, but readily ate an egg of *Cisticola natalensis* (finely speckled); refused with much apparent annoyance, biting my fingers and the forceps, the Canary egg, but this time also refused one of *Prinia mystacea*, two in turn of *Coliuspasser ardens*, and one each of *A. albi-*

frons, *H. jamesoni* (spotted blue form), *S. ocularia*, *Cisticola* of the above three species, and *Estrilda astrild*, but ate a bit of porridge. The *Macronyx* egg, lying near him, was ignored to the end. I placed a small feed of porridge in the cage.

Preferences (the Bulbul and *Crateropus* results were quite possibly unreliable, as the eggs were drying): (1) *H. jamesoni* (plain blue and spotted blue), *Sitagra ocularia*, *A. albifrons*, *Coliuspasser ardens*, *E. astrild*, *Cisticola natalensis*, *C. semitorques*, *C. subruficapilla*, and *Prinia mystacea*—five Ploceids and four Warblers. (2) *Macronyx croceus* (hard-set) and *Serinus icterus*.

Expt. 4. Feb. 4.—This morning I found the bread and porridge eaten, the *Macronyx* egg still uneaten. I removed it, and at about 10 A.M., having just taken another clutch of *M. croceus* (slightly set), experimented again. I first gave the rat two small scraps of bread, then a Canary's egg (*S. icterus*). He refused this most persistently, but accepted and ate a hard-set Bulbul's; he once more smelt and persistently refused the Canary's egg, which had been left in, and this time refused as persistently a fresh Bulbul's egg and a *Macronyx* egg from the new clutch; refused a *Crateropus* egg, but readily ate a spotted blue egg of *H. jamesoni*, and once more refused persistently the *Macronyx* and *Crateropus* eggs. I could not re-offer the Bulbul's egg, as the rat had passed over it and broken it. He made no attempt to lick up the contents. I now put in an egg of *H. jamesoni* (spotted blue). He ignored this for some minutes, and I went to lunch. I returned in the middle of the meal—perhaps a quarter of an hour—and, finding it still uneaten, added that of an *A. albifrons*. Returning probably twenty minutes later I found this egg completely licked out and the other either half-eaten or half-split—it was overturned. I added a *C. semitorques* egg (white with large blotches) and another *A. albifrons*. There was considerable delay before either was touched. Finally, I found the *A. albifrons* egg nearly completely eaten and the rat now ignoring both. I removed them.

Apparent preference :

	1. <i>Amblyospiza albifrons</i> .	
	2. <i>Hyphantornis jamesoni</i> (spotted blue).	
<i>Crateropus kirki</i> ,	3. <i>Pycnonotus layardi</i> (hard-set).	} <i>Cisticola semitorques</i> .
<i>Macronyx</i> (fresh).	4. <i>Macronyx croceus</i> (hard-set) and <i>Serinus icterus</i> .	

Expt. 5. Feb. 4. Later experiment, 8 P.M.—No food since last experiment. Most persistently and for a very long time refused the Canary egg, very readily ate one of *C. ardens*, continued to ignore that of the Canary, gnawed slightly and rejected a leg each of small nestlings of *A. albifrons* and *Colius minor*.

Preferences :

1. Egg of *Coliuspasser ardens*.
2. „ *Serinus icterus*.

Nestlings of *A. albifrons* and *Colius minor* were rejected when the rat must have been still far from repletion-point.

Expt. 6. Feb. 5.—Gave only a small feed last night to rat (of water-made maize-porridge only, no animal food) and nothing this morning. At 8.30 A.M. I began to experiment. I first inserted the cream-coloured egg of *Chalcopelia afra*, nearly fresh, and the rat ate a third of it, lapping and stopping, lapping and stopping, before I removed it. I allowed three or four minutes for possible after-effects, and re-offered the egg. Another third was now eaten before I again removed it, and offered a diminutive scrap of bread, which was at once hungrily accepted and eaten. On my replacing the Dove's egg in the cage, the rat again began to eat it and I again removed it. I offered the Canary egg. I had only one left intact, and what remained of yesterday's was drying up. I accordingly blew a greater part of the former (fairly hard-set) into the latter's shell and offered this. The rat at once ate out all its contents—those of the other egg and its own,—ate two small scraps of bread, ate without hesitation the remaining contents of the new Canary egg; commenced to eat also a slightly hard-set egg of

M. croceus (yesterday's clutch), but I withdrew it; ate a *C. semitorques* egg (blotched) left uneaten from yesterday and the remains of the *Hyphantornis* and *A. albifrons* eggs of yesterday (a good deal less than half in each); ate the whole of the remainder of the *Macronyx* egg and the rest of the Dove's, then another *A. albifrons* and neglected the next, as also one of *H. jamesoni* (spotted blue) and one of *C. ardens*. Later he had eaten part of the latter and was now neglecting it, and he also neglected an egg of *C. ardens*. He similarly neglected, as persistently, the eggs of *P. mystacea*, *Cisticola semitorques* (practically spotless, pale blue, unusual), *C. afra*, and *M. croceus*. He became irritable at the end, and knocked the last two eggs right away with his fore feet, and kept gnawing savagely at the ground. Whether these symptoms of irritation were provoked by my insistence, by dislike of the eggs offered, or by internal happenings, I was unable to judge. He also refused to touch bread, either in scraps or in large pieces, even when placed in his cage.

The sun now began to break through the clouds, and as it had been very cold in the verandah I put him out. He soon began to show much liveliness, and attacked and finished the bread—two or three of the pieces being fairly large.

This lapse into apparent indiscriminateness was puzzling. I have seen the same thing happen in the case of a Butcher-bird (*Lanius collaris*), normally discriminating, in relation to highly nauseous insects. It may conceivably have been due to a lack of the animal element in the rat's diet during the last twenty-four hours (except for last night's *C. ardens* egg), or, very likely, it may not.

Expt. 7. Feb. 5.—I left in a hard-set *Macronyx* egg from the first clutch. The rat ignored it for a long time. I added an egg of *A. albifrons* and went away. On my return fifteen minutes later both eggs remained untouched. I added an egg of *S. ocularia* (typical coloration), and, being still busy, left for twenty minutes. On my return I found the last-named egg licked clean out, and the other two still

being ignored. The rat continued to ignore them, and I finally removed them.

Apparent preference :

1. *Sitagra ocellaria*.

2. *Amblyospiza albifrons* and *Macronyx croceus*.

Expt. 8. Evening, 8 P.M.—No food since the afternoon experiment ; accepted and readily ate a fresh egg of *A. albifrons*, refused the hard-set egg of *M. croceus*, and continued to ignore it persistently for perhaps fifteen minutes, but at once accepted and ate an egg of *A. albifrons* which I now added to that of the *Macronyx*. I next added to it two *C. ardens* eggs—one fresh, the other hard-set, and each (as always) opened.

The rat selected the hard-set Whydah egg and ate it, and I added an egg each of *Prinia mystacea*, *C. semitorques* (unspotted), and (again hard-set) of *C. ardens*. The rat selected the *Prinia* and ate it. I now had to discontinue the experiment and removed the eggs.

Apparent preference : (1) *Amblyospiza albifrons*, *C. ardens*, and *Prinia mystacea*. (2) *Macronyx croceus*. The experiment was not continued long enough to ascertain whether *C. ardens* and *C. semitorques* were really less liked than the *Prinia*. It may have been merely a selection of one of three species, for all of which he was sufficiently hungry.

Expt. 9. Feb. 6.—I gave the rat last night, in addition to his porridge, as animal food, a good many small grasshoppers of the species best liked by my birds. No milk. He had eaten all the grasshoppers when I looked this morning.

I was busy close by throughout this experiment, and simply ran every three or four minutes to see what was happening.

The rat at once accepted a nearly fresh *Sitagra ocellaria* egg, and refused yesterday's hard-set egg of *Macronyx croceus*. I returned later two or three times, and still always finding it uneaten added one of *Amblyospiza albifrons*. This was at once eaten. I now left in the *Macronyx* egg alone, and returning later found that its solid contents

had been pulled out and were lying, damaged but now neglected, beside it, while the rat had returned to the empty shell of the *Amblyospiza* egg, and was assiduously licking out its inside. Returning three or four times I every time found the *Macronyx* egg and its extracted contents lying untouched, the rat close to it but completely ignoring it. I therefore added a second, only slightly set *Macronyx* egg from the second clutch, opening it slightly as usual. This was as persistently ignored as the other, so I added an egg, just slightly set, of *Chalcopelia afra* (from the same clutch as yesterday). This was also persistently ignored (it may, of course, have been *tasted* in my absence), and after two or three visits I removed the fresher *Macronyx* egg and pushed the other slightly away, leaving the Dove's egg alone just under the rat's nose. He still refused it, so two or three visits later I placed beside it an egg of *A. albifrons*, very slightly set. This was at once taken and eaten. I placed the fresher *Macronyx* egg beside the Dove's, and both were now persistently ignored. I replaced the *Macronyx* egg by one of *H. jamesoni* (spotted blue) and the latter's contents were at once completely eaten. I again inserted the fresher *Macronyx* egg, and it and the Dove's continued to be neglected. I placed beside them a fresh *C. ardens* egg and went away for twenty minutes. Returning I found only the Whydah Bird's eaten. The hard-set *Macronyx* egg and its embryo had been lying conspicuously a little to one side throughout the experiment, and remained untouched not only up to this point but about twenty minutes later still, when I removed it.

Later.—To-night I am again giving the rat water-made maize-porridge *only*—no animal food. The idea is to see whether it will affect his discrimination to-morrow.

Preferences shown (very decidedly) :

1. *Amblyospiza albifrons*, *Hyphantornis jamesoni* (spotted blue), and *Coliuspasser ardens*.
2. *Macronyx croceus* (both hard-set and nearly fresh), *Chalcopelia afra* (nearly fresh).

Expt. 10. Feb. 7, 10 A.M.—No food since last night's

porridge. I was busy again, and after the first few acceptances was only able to return at considerable intervals.

The rat, ravenous in manner, at once ate an egg of *Sitagra ocellaria*; licked out a portion of a slightly hard-set Turtle-Dove's egg (*Turtur damarensis*) that, for convenience of insertion in the cage, I had blown into an *Amblyospiza* shell painted with black patches of water-colour for the sake of distinctiveness; refused to touch some water (offered to guard against the possible complication of thirst—as his supply of water was finished), and, so long as I remained present, refused yesterday's egg of *M. croceus*; but he at once ate another *Sitagra* egg. I left for some time, and on my return found the *Macronyx* egg eaten and lying to one side, but by no means licked out like the *Sitagra*'s. The rat then licked out another very small portion of the *T. damarensis* egg, and refused persistently to attack an egg of *Chalcopelia afra*. I left for at least twenty minutes, and on my return found it still uneaten; but a further small portion of the *Turtur*, now inserted, was licked out of a shell coloured as usual. I once more left for a very considerable time, and returned this time to find the rat just lying down, after eating the *Chalcopelia* egg. This, too, was by no means cleanly licked out. Another small portion of Turtle-Dove's egg was then licked out, but the rat after this refused all eggs (including *C. ardens*, *S. ocellaria*, and blue *H. jamesoni*), burying his head in a corner whenever I brought one up to him.

This was nearly two hours after the commencement of the experiment, such had been the interruptions. I left in the cage three *Coliuspasser* eggs (one fresh, one hard-set, one medium), the blue *Hyphantornis* (fairly hard-set), and the *Sitagra ocellaria* egg (fresh). Nearly half an hour later (12.25 P.M.) a quarter of the latter had been eaten, and it was now lying abandoned and the rest remained quite uneaten, though the rat showed great eagerness for a small scrap of brown bread, which he ate. At about 2 P.M. all were still uneaten and I added a fresh *Amblyospiza* egg. At 3.30 P.M. only this had been eaten, and the rat continued to refuse the others. He accepted readily and commenced to

nibble a grain of buckwheat—I could not see if he finished it; accepted with disinclination, and began to eat a leg of a nestling *A. albifrons*, and eagerly ate a scrap of bread; afterwards returning to the Weaver leg, but relinquishing it at once in favour of a second scrap of bread. He finally finished the leg and ate more bread.

Comment.—“I was able to give too little consecutive time to the experiment. Preferences were shown, and the long delays must also be taken into account as conducing to hunger. At the same time the experiment seemed to me to bear some resemblance to that of the day before yesterday. Does the rat have his rash days, or is it merely the result of too little animal food during the preceding twenty-four hours?”

Apparent preferences: (1) *Sitagra ocularia* and *Turtur damarensis*. (2) *Macronyx croceus*. The *Turtur* appeared to be preferred, too, to *Chalcopelia*, and a preference was shown at the end for fresh *Amblyospiza* as against *Coliuspasser* (new-laid, medium, and incubated), blue *Hyphantornis* (fairly fresh), and *Sitagra* (fresh). •

Expt. 11. Feb. 8.—Gave the rat a large and varied feed at 8 P.M. yesterday evening, both animal and vegetable. The former consisted of a head and leg of a small nestling *A. albifrons*, several grasshoppers of the pleasanter species, and milk—the vegetable food of maize-porridge and banana. An egg of *C. ardens* was also left in. This morning all had been eaten, except a small scrap of banana.

I added, fairly early in the morning, a very hard-set egg of the *Coliuspasser*. This was neglected, and continued to be so for some time. Eventually I noticed it had fallen behind the tray, and not wishing to disturb the rat overmuch, as I intended to experiment, did not attempt to ascertain whether it had been emptied or not. Later in the day I noticed it was eaten.

At about 11 A.M. I broke down the side of yesterday's *T. damarensis* egg to the level of the liquid (it was more than half-full still and less hard-set than I thought yesterday) and inserted it. The rat lapped a few times, then abandoned

it, and shortly afterwards lapped again and abandoned it. No further developments occurring, I went away and, returning considerably later, found the egg pushed aside, but no noticeable further diminution in its contents. I placed beside it an egg of *C. ardens*, somewhat set, which was at once attacked and eaten. I replaced it with a nearly fresh egg of *Dryoscopus guttatus*. This was tried, then neglected. I went away for a short time and on my return found the *Dryoscopus* egg two-thirds eaten. The remainder had been abandoned. I left in beside it a second egg from the same *Dryoscopus* clutch, and this was shortly afterwards tried and at once rejected. As the rat took no further notice of it I went to my work, and simply returned two or three times at intervals, one or two of them as long probably as half an hour. The *Turtur* egg and the two of *Dryoscopus* remained untouched beside the rat throughout, except that I once found the *Turtur* egg somewhat shifted—but with no appreciable diminution in its contents. I then added an egg of *A. albifrons* which was not attacked during the three or four minutes during which I watched it, but had been eaten when I returned half an hour later, though the others remained untouched.

I now left in the Dove's egg alone for a considerable time, and it remained untouched. I put in again first one *Dryoscopus* egg and later the other. The second was lapped at and refused; otherwise both were neglected, though pushed in turn under the rat's nose and left there. I then put in a half egg, very slightly set, of *Centropus nigrorufus*. The egg closely resembled the Dove's both in size and colour, and I therefore mottled it over with red water-colour paint to give it a distinctive appearance. Even so, owing to its being only a half egg longitudinally cut, very little of its outside probably showed, and the general impression was doubtless that of a Turtle-Dove. Whether for this reason or on its merits (I did not actually see it tasted) the egg remained uneaten, though left in for a very considerable time. So did one of *Telephonus senegalus*. That of a Whydah Bird (*C. ardens*), very hard-set, was, however, attacked and had its

more liquid portions eaten, the solidest parts of the embryo being left uneaten on the ground. The rat then ate a nearly fresh egg of *H. jamesoni* (Bulbul-like form) which I added to the others, and a little later had eaten a portion of a fresh egg of *Coliuspasser ardens* with which I replaced it. This was now being neglected, but I put in beside it a fresh egg of *T. senegalus*, and a very little later found the *Coliuspasser* egg finished, but the *Telephonus* egg quite uneaten. Some considerable time afterwards I found a very small portion of the *Telephonus* egg eaten, the rest abandoned. I left all in together for a considerable time, and, as there were no further developments, added the eggs of *S. ocularia* and *Hyphantornis jamesoni* (Bulbul-like form). These were eventually eaten, the others remaining untouched to about 4 P.M., when I removed all but the Dove. This is still uneaten this evening.

Apparent preferences: (1) *S. ocularia*, Bulbul-like *H. jamesoni* (nearly fresh), *C. ardens* (fresh and hard-set—the solid portions of the latter egg were neglected), *A. albifrons*. (2) *Turtur damarensis*, *Dryoscopus guttatus*, *Telephonus senegalus*, and probably *Centropus nigrorufus*.

Expt. 12. Feb. 9.—Gave the rat a large mixed feed again last night. A little was left in the morning. At about 9 A.M. I commenced to experiment, placing the practically fresh egg of *Colius minor* in the cage. The rat tried and at once left it, and continued persistently to ignore it. I later added to it a fairly hard-set egg of *P. layardi*. This was equally persistently ignored, probably, from the slightly altered look of the opening, after tasting, and a very Bulbul-like egg of *H. jamesoni* (rather set), that I showed off to the rat before inserting it, was also continuously ignored. I next showed him and inserted a fresh *white* egg of *H. jamesoni*. After a little hesitation the rat tentatively tried it, and then at once pulled it from amongst the other two, and ate the whole of its contents. There was a possibility that the freshness or otherwise of the eggs had influenced the rat's decisions, so I inserted a beautifully fresh egg of *Colius*

minor (there had only been one in the nest). I had no new-laid Bulbul's eggs to offer. This Coly egg was at once tried and rejected, and the rat refused to have anything more to do with it. After an interval, during which no developments took place, I added a medium hard-set egg of *H. jamesoni* (Bulbul-like form). This was also at first ignored, and I added a perfectly *fresh* egg of the same form and a fairly hard-set egg of the white form. The somewhat set Bulbul-like egg was the next to be selected and eaten, in spite of its coloration.

A little later, as there had been no further developments, I removed the remaining (first-inserted) Bulbul-like hard-set egg and the white hard-set egg of *H. jamesoni*, and put in instead a fresh egg of *T. senegalus* from a different clutch from yesterday's. I went away for quite an hour and on my return found that nothing had happened, unless, possibly, the opening of the *Telephonus* egg had been slightly enlarged, indicating trial. I now left in the cage simply the Bulbul egg, the fresh Coly egg, and an egg of *D. guttatus*. Nothing having happened, I added the *Telephonus* egg. Again nothing happened, and I gave the rat a maize-grain, which was eaten. The eggs were again ignored, and I added two fresh eggs of *H. jamesoni*, one spotted blue, the other of the Bulbul-like form, both fresh. The rat at once ate the former, but continued to ignore the second, as also a *Coliuspasser ardens* egg and one each of *S. ocularia*, *Cisticola semitorques* (a Stonechat-like form), *Prinia mystacea*, and *Estrilda* sp., which I now added at short intervals. Looking in soon after adding the last, I saw that the *Coliuspasser* egg had been eaten—possibly (without my noticing it) before some of the last additions.

As a little time now elapsed without further developments, I removed all the remaining eggs. The rat ate three maize-grains and a small piece of brown bread and butter, but refused to go on with this, and had, in fact, shown some disinclination for the mealies too—as yesterday. He had not been greatly inclined for eggs generally—probably the

result of his feeding in the night,—but to-day again there seemed no reason to doubt the preferences so clearly shown. They were

(1) *Hyphantornis jamesoni* (white form, spotted blue form, and one, rather set, of the Bulbul-like form), and *Colius passer ardens*.

(2) *Pycnonotus layardi* (fairly hard), *Colius minor* (nearly fresh and very fresh), *Telephonus senegalus* (fresh), *Dryoscopus guttatus*. Neglect of Bulbul-like eggs of *H. jamesoni* was perhaps due to their resemblance, closer than the white forms, to a Coly's or Dove's.

Expt. 13. Feb. 9, evening.—Refused persistently a hard-set egg of *P. layardi* and a fresh egg of *C. striatus minor*, but readily ate a fresh *T. senegalus* egg, then refused persistently one egg each of *P. layardi*, *C. striatus minor*, and *D. guttatus*. On my adding another egg of *T. senegalus*, this, too, was persistently ignored. Later I added one of *A. albifrons*, which was treated in the same way, as was one of *H. jamesoni* (Bulbul-like form) added a little later. But a *Sitagra ocularia* egg added to them was at once eaten.

Apparent preferences :

- | | |
|---|---|
| 1. <i>Sitagra ocularia</i> . | |
| 2. <i>Telephonus senegalus</i> . | |
| 3. <i>Pycnonotus layardi</i> (hard-set) and
<i>Colius minor</i> (fresh). | $\left. \begin{array}{l} \text{ } \\ \text{ } \end{array} \right\} \begin{array}{l} \textit{Amblyospiza albifrons}, \\ \text{Bulbul-like } \textit{H. jamesoni}. \end{array}$ |

It would be interesting to know if the acceptance of the first *Telephonus* egg was unregretted and to be relied on.

Expt. 14. Feb. 10.—Morning: after a mixed but not large feed last night (*A. albifrons* nestling's head, six maize-grains, milk, two good-sized grasshoppers). Refused persistently, first a Coly egg alone, then the Coly egg and a Bulbul egg, then a nestling Bulbul two days hatched, then a part of a slightly older but quite unfledged *A. albifrons* nestling, and, finally, an egg of the last-named species and one of *C. ardens*.

CONCLUSIONS FROM EXPERIMENTS ON THE RAT.

The rat's preferences in eggs were more marked than the lemur's, the unwelcome eggs being in some cases allowed to lie neglected for many hours together, even when the animal was more or less hungry ; and, again unlike the lemur, the rat did not require to be fed nearly to repletion before he would begin to discriminate. A marked exception to this rule occurred on Feb. 5th, when the animal lapsed into complete indiscriminateness. An insufficiency of animal food during the preceding twenty-four hours, in combination with the bitterly cold day, suggested itself to me as an explanation, and I tested this in my subsequent dieting of the rat, but it may not be the correct one. At any rate, he usually discriminated and was consistent, and it is possible to set forth approximately the preferences shown in the form of the following table—not that the material used in these experiments was sufficient to justify us in supposing that their results necessarily represent what would have been the rat's final verdict on all the species used. Still, the lemur's general confirmation of the rat's preferences seems to show that—at any rate, in the main—they represent the impression the eggs would make on an egg-eating animal, and a second rat, on which, owing to its extreme wildness and the limited supply of eggs, I did not continue to experiment, showed exactly the same initial eagerness for the eggs of Weavers and the same dislike for an egg of *P. layardi* :—

<i>Estrilda astrild.</i>	1. <i>Sitagra ocularia.</i>	
<i>Cisticola natalensis,</i>	2. <i>Amblyospiza albifrons.</i>	} <i>Coliuspasser ardens.</i>
„ <i>subruficapilla,</i>	3. <i>Hyphantornis jamesoni</i>	
<i>Prinia mystacea.</i>	4. <i>Crateropus kirki,</i>	} 3. <i>Cisticola semi-</i>
	<i>Tel. senegalus,</i>	
<i>Turtur capicola.</i> { 4.	5. <i>Pycnonotus layardi,</i>	} 4. { <i>Dryoscopus</i>
	<i>Colius striatus.</i>	
	6. <i>Macronyx croceus, Serinus</i>	} <i>guttatus,</i>
	<i>icterus, Chalcopelia afra.</i>	

On one occasion only, I think, *Amblyospiza* was eaten in preference to *Sitagra*.

The Bulbul-like form of *Hyphantornis jamesoni* rather specially tended to be refused—perhaps the result of the likeness, which was usually better than the resemblance borne by, *e. g.*, the white form to the other white eggs of the experiments.

The eggs of all but three species in this list are always or very frequently laid within ordinary climbing range of a rat.

EXPERIMENTS ON AN INDIAN MONGOOSE.

Expt. 15. June 27, late afternoon.—Ate readily a minute scrap of beef, then ate eggs of Grey Wagtail and Blackbird. Smelt and refused Fowl's egg, even a small portion in a spoon, but ate with much smelling and tasting a Hedge-Sparrow's; then smelt and refused all eggs I could offer, including not only the above species but a Great Tit's, a Wren's (*Troglodytes parvulus*), and others. But he ate with some slight eagerness a common mouse, and, with distinctly greater eagerness, a piece of beef.

On the two previous days that he has been in my possession he has on several occasions eaten beef in strong preference to mice, and with eagerness even when the latter had been actually refused.

Order: (1) beef; (2) common mouse; (3) *Accentor modularis*'s egg, probably preferred to (4) that of *Gallus domesticus*. Great Tit's, Wren's, and Grey Wagtail's eggs were also below (2).

Expt. 16. June 28.—I left the mongoose for food last night only a Fowl's egg. It is still uneaten. The animal smelt and refused in turn fresh eggs of Spotted Flycatcher, Wren, and Fowl, but ate readily, after smelling and tasting it, a partly-incubated House-Sparrow's egg; smelt and refused fresh eggs of Spotted Flycatcher, Wren, Fowl, and Grey and Pied Wagtails, but smelt and most readily ate a fresh House-Martin's egg. Smelt and refused all as before, also one each of Willow-Warbler, Hedge-Sparrow, and, less decidedly, Song-Thrush; but, on smelling it, ate with eagerness a fresh House-Sparrow's egg, returning to the empty shell again

and again, and licking it out or crunching it, while still ignoring the various rejected eggs placed before him. Repeated his previous refusals up to and including Hedge-Sparrow, but, with some hesitation, started on the Thrush's and ate it. I removed it before it was quite finished and repeated the offerings. All were refused but the Thrush's, which was accepted and finished, but not licked out exhaustively like the Sparrow's. Following this, the mongoose started on the Hedge-Sparrow's, but did not finish it. He then repeated his various refusals, including Hedge-Sparrow's, but *readily* ate another freshly-laid House-Martin's, returning to it and frequently licking it out, etc., as before, long after it was emptied, and again repeated all his refusals. This time, several of the previously-refused eggs were refused at sight—an important point. I, nevertheless, held them persistently to his mouth till each was definitely smelt and refused. I obtained in this way an actual tasting of the Flycatcher's (followed by a prompt rejection) and a scrunching between the teeth of the Pied Wagtail's, the mongoose then throwing it right down and shaking his head. I had placed each egg on the ground under his nose as it was refused, and he now smelt them all over and refused to touch any but the Hedge-Sparrow's, which he returned to and ate. I then picked each up in turn and offered it, again placing each below his nose as he refused it—and he refused every one. Finally, I offered another House-Martin's egg, and this was at once accepted and eaten. After a yet further repetition of his various refusals, he went on to eat a very hard-set *Sylvia simplex* egg (its advanced state of incubation may, of course, have influenced this acceptance); then once more repeated his refusals, but ate beef with even greater eagerness than he had shown for anything else.

I left in the cage the various species of egg used, excluding Hedge-Sparrow, Thrush, House-Martin, and Sparrow, and, one-and-a-half hours later, found the Flycatcher's broken but not eaten, the two Wagtails' broken and possibly eaten (a moisture on the ground was not necessarily theirs), and only

two eggs left intact, but both overturned—the Wren's and Willow-Warbler's.

I think I can say that during the main experiment the mongoose once or twice showed slightly more inclination to try the Flycatcher's and Wagtail's eggs than the Wren's or Warbler's; one or two actual tastings (followed, it is true, by rejection) were obtained.

Order: (1) beef (to judge by manner); (2) *Chelidon urbica* and *Passer domesticus* (both new-laid); (3) *Turdus musicus*; (4) *Accentor modularis*; (5) *Muscicapa grisola*, *Motacilla sulphurea*, *M. alba yarrelli*, *Troglodytes parrulus*, and *Phylloscopus trochilus*, the last two possibly least liked; also *Gallus domesticus*.

"I was a little surprised," I wrote, "at the relatively high placing of Thrush and Hedge-Sparrow and the very low placing of Wren and Willow-Warbler. Of course, one does not yet know how many or how few grades may come below the latter, while there are quite probably gaps to be filled between grades 2 and 3. At any rate, I could in no way complain of the experiment, it being, as regards decided and unequivocal action on the animal's part, as good as any I have ever carried out. The contrast between grades 2 and 5 was very strongly marked, and lasted to the end of a longish experiment—for the short account I have given does not convey a full idea of the re-offering and coaxing that took place to give the mongoose every chance of reconsidering his refusals. Two different Wren's eggs were used, three Spotted Flycatcher's (from two clutches), only one Willow-Wren's, but two of each kind of Wagtail, and three Martin's. In every case the mongoose's treatment of eggs of the same species was identical—excepting that he grew hungry enough for the Thrush's and Hedge-Sparrow's, at first refused."

Expt. 17. June 29.—Last night I left in the cage, as well as meat (duck), a fowl's egg and a duck's egg. The meat and a considerable part of the fowl's egg were eaten by this afternoon, the duck's egg untouched. I had made a large hole in each egg and placed them side by side.

To-day (late afternoon) I offered some fowl's egg (both yolk and white) in a spoon. The mongoose ate a little and desisted, refusing to touch it again, smelt and refused an egg each of Wren, Willow-Wren, Grey Wagtail, and Pied Wagtail, but smelt and proceeded to eat a Spotted Flycatcher's; again refused the two Warblers' and the two Wagtails', but at once commenced to eat another Spotted Flycatcher's; smelt and refused all as before, also the fowl's, but at once, after smelling it, commenced on a Spotted Flycatcher's from another clutch. I removed this, and he repeated all his refusals, but smelt and began to lick out a Hedge-Sparrow's egg that I held out to him. He soon desisted, however, and at this moment I accidentally dropped it between his fore feet. He ignored it, however; then repeated all his previous refusals, but with real eagerness (in marked contrast to his acceptance even of the Flycatcher's eggs) attacked, on smelling it, a House-Martin's egg. He not only licked up its contents with the greatest rapidity and zest, but kept returning to the empty shell and licking and licking it, or crunching it further as a preliminary to yet further licking. I next offered a nearly unspotted Wren's egg. Deceived possibly by the white colour, he came forward with the greatest alacrity, but withdrew promptly on smelling it. He then smelt and refused a Willow-Wren's egg, the Wren's again, and both Wagtails', but accepted and ate a Spotted Flycatcher's. I let him finish it—the Hedge-Sparrow's was still lying ignored, possibly unnoticed (being far back),—and again offered the fowl's egg in the spoon. This time he ate a little of it, but quickly desisted, and, on my pressing it on him, rejected it with a flick of his tongue below the spoon—an action I have seen my cat employ in rejecting birds.

The mongoose then smelt and refused all as before, but smelt very thoroughly and attacked a somewhat incubated, but also somewhat stale, Sandpiper's egg, going on with it with some eagerness once he had started. I removed it very soon, and he then repeated all his refusals, but smelt and readily attacked a somewhat incubated Blackbird's egg;

then, with an appearance of increased appetite, once again attacked the portion of a fowl's egg re-offered in a spoon. He showed (as he has done before) a marked preference for the yolk, and desisted when he had finished such as was present. He neglected most of the white.

The order suggested was: (1) *Chelidon urbica*, easily first. It is quite likely that three or four grades may be found to intervene between this and (2) *Muscicapa grisola*. In these grades, as in (2), would come the half-incubated Blackbird's egg and the half-incubated and somewhat stale Sandpiper's egg (not a fair test) of this experiment. (3) *Accentor modularis* and *Gallus domesticus*. (4) *Motacilla yarrelli* and *M. sulphurea*, *Troglodytes parvulus* and *Phylloscopus trochilus*.

With the exception of the Sandpiper's, all the eggs used were fresh, and, with the exception of that egg and the Blackbird's, all were quite unincubated. The placing of the Hedge-Sparrow's was not quite convincing, owing to its unfortunate escape; therefore it cannot be regarded as quite certain that it has now been placed below the Spotted Flycatcher's in the mongoose's estimation, though that is probable.

Expt. 18. June 30.—In the night the mongoose again ate all the meat he was given and a fowl's egg, but again ignored a duck's egg. At 11 A.M. to-day I commenced to experiment. He smelt and refused a Pied Wagtail's egg; smelt and refused the same broken into a spoon, the shell removed, beautifully pellucid and fresh; smelt and refused a Wren's egg and again the broken Wagtail's, going on to refuse it persistently even when pushed right up to his nose; refused a Spotted Flycatcher's at sight, but on my pressing it on him he inserted his tongue and ate much of it readily enough before I removed it. He at once, then, began to eat the broken Wagtail's too, but quickly desisted and refused it persistently, though he at once attacked and finished the Flycatcher's re-offered. He then again tackled the Wagtail's, but quickly stopped, having diminished it to no appreciable extent by these two attacks. It should be

remarked, however, that even the Flycatcher's was not licked out with great thoroughness yesterday or to-day: this may be contrasted with his treatment of House-Martins' and Sparrows' eggs.

He next ate a portion (all I offered) of a Kestrel embryo nearly ready to hatch, ate a very little of the white of the broken Wagtail's egg (in this case he ignored the yolk), then desisted and refused to eat more; smelt and refused Grey Wagtail's and Wren's, and, on my leaving them under his nose, ignored them, then reached right over and past them to a wing of the Kestrel embryo that I had previously dropped, then (stimulated?) bit into but relinquished without eating it the Grey Wagtail's egg and continued to ignore it and the others.

Fifteen minutes later the eggs of the Wren and Wagtail were still being ignored. He smelt and refused the Pied Wagtail's egg in the spoon (definitely offered), licked up a little white of a duck's egg in another spoon, repeated all his usual refusals, also Willow-Wren, but ate a somewhat hard-set Blackbird's egg.

He smelt and refused eggs of Wren, Grey and Pied Wagtail, and Willow-Warbler, but smelt a Spotted Flycatcher's egg, and, on my putting it down on my side of where I had placed the Wren's and Grey Wagtail's, leaned over them to it without rising completely from his bed and tried to lick it out. He could not avoid getting sand on to it, however, so drew back and smelt and refused each of the others, then leaned forward again to the Flycatcher's, and, stretching out a paw, drew it towards him up to and between the other two (separating them with it as he pulled it through), and there licked it completely out, took a lick or two at the Grey Wagtail's but at once desisted; smelt and refused the Wren's egg as it lay there, and again licked out assiduously the already empty Flycatcher egg—presumably hungrier than on previous occasions.

Apparent order of preference: (1) *Muscicapa grisola* (fresh); *Falco tinnunculus* (ready to hatch); *Merula merula* (semi-incubated); Domestic Duck (fresh). (2) *Motacilla*

jarrelli, *Motacilla sulphurea*, *Troglodytes parvulus*, *Phylloscopus trochilus*.

The apparent preference for fowls' eggs against ducks', which the mongoose's nightly choice seems to indicate, may be more apparent than real. It can only be tested by definite experiment.

Expt. 19.—The following experiment was an uninterrupted continuation of that just described, but, as the eggs used were, purposely, mostly stale ones, it will be best to describe it separately.

A possible objection to the reality of such preferences as were being shown had struck me: even though to human senses every egg offered might be equally and perfectly fresh, might not a day or two's difference in their taking be perceptible to the mongoose, and be what really decided him to take some and leave others? I had some more or less addled eggs on hand, so it seemed well to test the point more fully than I had done with the Sandpiper's egg.

The experiment was long, and in many ways highly interesting; but, as stale eggs are "not evidence," I will content myself with summarizing it.

Amongst addled eggs, Garden-Warbler, Hedge-Sparrow, Bullfinch, House-Sparrow, Golden Plover, Common Sandpiper, Oyster-catcher, Pheasant, and Red Grouse were eaten more or less readily, even eagerly; while Great Tit and Eider-Duck (and the new-laid eggs mentioned below) were consistently refused. Amongst practically fresh eggs, House-Sparrow and Bullfinch were thus preferred to Great Tit and Eider. Two highly incubated eggs (Garden-Warbler and Kestrel) were both placed high. Amongst new-laid eggs, Pied Wagtail, Grey Wagtail, Wren, Willow-Wren, and Domestic Duck were all refused throughout a long experiment, and Spotted Flycatcher and Lesser Whitethroat were similarly refused, but were not necessarily placed as low as the others, as the mongoose was now filling up, though he still, after refusing them, ate nearly fresh Sparrow and Bullfinch eggs and addled Hedge-Sparrow and Grouse.

An apparent preference was shown early for the less

addled of two Great Tit's eggs, but practically none of it was eaten, so that it can hardly count for much; and the rest of the experiment showed clearly that the mere fact of being stale—even highly so—did not act as a deterrent to this animal.

Expt. 20.—In the early afternoon the mongoose smelt and refused duck meat, a duck's egg, a nearly fresh Eider's, a Wren's, Grey and Pied Wagtails', Willow-Warblers', Great Tits', etc.; all but the Eider's were new-laid. He eagerly ate a fresh House-Sparrow's egg, which I removed before he had finished it; smelt and refused a piece of duck meat and the above eggs again, also a Spotted Flycatcher's, but readily went on with the Sparrow's egg and licked it out well; again refused duck meat, but returned to his licking of the Sparrow's egg; yet again refused all and the meat, but again returned to the crunching and licking of the Sparrow's egg.

In the evening he showed a marked preference for beef (for which he was, and always is, most eager, though it is not his natural prey) as against duck meat.

Probable order: (1) Egg of House-Sparrow; beef. (2) Duck meat; eggs of Domestic Duck, Eider, Wren, Pied and Grey Wagtails, Willow-Warbler, Great Tit, Spotted Flycatcher.

Expt. 21. July 1, late forenoon. *Does the unpleasant Quality reside in the Yolk or the White?*—Ate a little fresh duck's egg, then smelt and refused both fowl's egg and the duck's; though he certainly, I thought, appeared a little more attracted by the latter. Smelt and refused Great Tit's egg and both fowl's and duck's eggs, but readily ate a Spotted Flycatcher's. Smelt and refused eggs of Great Tit, Wren, fowl, duck, and Pied Wagtail (freshly opened), but ate a Grey Wagtail's (long-opened); smelt and refused again the five species just enumerated, but ate a *freshly*-opened Grey Wagtail's; smelt and refused the duck's egg and some of the white poured out into a spoon, but readily ate its *yolk* from a spoon, licking it out very assiduously; smelt and refused (licked up a *very* little before rejecting)

the white of a fowl's egg, but readily ate its yolk, licking it clean; licked once or twice into the white of a Wren's egg offered similarly in a spoon, but quickly desisted and withdrew, and, sometimes smelling it (when I pressed it on him), refused it as persistently as he had already done the whites of the fowl's and duck's. I then offered the broken shell of the Wren's egg, containing now only the yolk, and he merely licked it once and withdrew. I then turned the yolk out into a spoon and it was smelt and eaten, though just possibly, I thought, with not quite the appreciation shown for the other two.

Order of preference: (1) Spotted Flycatcher, Grey Wagtail, and yolks of Fowl's, Duck's, and Wren's eggs. (2) Great Tit, Pied Wagtail, and *whites* of Fowl's, Duck's, and Wren's eggs.

Expt. 22. July 21, early afternoon.—Smelt and refused Pied Wagtail, Great Tit, and Wren, but readily ate a duck's egg with the yolk mixed up with the white, also a fowl's egg similarly prepared. I did not let him eat a great deal, but he seemed quite prepared to. He then smelt and refused a fowl's egg in which the relative positions of white and yolk were normal, but again readily ate the other, in which they were mixed, also the duck's; smelt and refused the Wren's, Pied Wagtail's, and Great Tit's, also, persistently, a fresh Hedge-Sparrow's, but ate a Spotted Flycatcher's; again smelt and persistently refused the Hedge-Sparrow's and the others already refused, but smelt and ate with real eagerness a House-Sparrow's egg, repeated his refusals, licked a Grey Wagtail's egg from a crack in which the white was flowing, but desisted almost at once and refused it, but ate with as much eagerness as the Sparrow's a not quite fresh Bullfinch's egg.

Order of preference: House-Sparrow and Bullfinch (latter not quite fresh) much more eagerly than (2) Duck and Fowl, with yolk exposed, and Spotted Flycatcher. (3) Fowl's egg with yolk protected by the albumen, Grey and Pied Wagtails, Great Tit, Hedge-Sparrow, Wren. Of these

the Grey Wagtail's was apparently found a little more tempting than the others.

Expt. 23. July.—The first part of the experiment was again a test of addled eggs and eggs with mixed and exposed yolks. Results as before. An interesting point was his refusal of fowls' eggs (several offered), though he had eaten badly in the night (fowl's intestines, which he never cares for, had been given instead of his usual meat and left untouched) and was now hungry enough to attack even Pied Wagtails', Wrens' and Great Tits' eggs, also ducks'. He attacked a fowl's egg, in which yolk and white were mixed. He also attacked a Turtle-Dove's egg (*Turtur auritus*).

He now smelt and refused the duck's egg, licked and refused the Dove's, smelt and refused the same Pied Wagtail's egg as before; but, after smelling it, attacked a Meadow-Pipit's egg; smelt and refused the Pied Wagtail's, but, on my continuing to press it on him finally licked into it and, breaking the yolk, went on with it; smelt and refused a second freshly opened Pied Wagtail's from the same clutch, its yolk well protected by the white, but readily ate a Meadow-Pipit's; smelt and refused the Pied Wagtail's, and this time a Meadow-Pipit's too, also a Garden-Warbler's and the Wagtail's and Pipit's re-offered; but, on smelling it, readily attacked a Greenfinch's. I withdrew it before he had finished it and re-offered the Wagtail's and Pipit's. He smelt and refused each, but accepted readily and finished the Greenfinch's.

He smelt and refused a fowl's egg, then came forward and smelt over the Duck's, a second Fowl's, the Dove's and the addled Moorhen's (all of which had been lying just before him all this time), and licked a little into the last, but desisted; smelt and refused the Pied Wagtail's, licked and refused a Meadow-Pipit's, smelt and refused the Garden-Warbler's, a Grey Wagtail's, and a Wren's; licked and refused one of the Meadow-Pipit's (of which the sides were now broken away, showing the yolk right on the surface, but still unbroken); and smelt and refused a cracked

Yellow-Hammer's egg, the white of which was oozing out most temptingly as I held it to him. This egg fell accidentally at his fore feet where he was lying, and he stooped, tasted, and refused it, began to lick up the contents of a Dove's egg in which the yolk had become mixed with the white, refused (first smelling it) the other Dove's egg in which these were separate, and returned to his eating of the first. He then repeated all his previous refusals, but readily attacked a Greenfinch's egg and, on my withdrawing it, followed it out of his sleeping-box—a thing he had done to no other egg in this experiment; again repeated his refusals, including fowl, but was rather inclined to eat the fowl's egg in which yolk and white were mixed.

That he was still not replete was shown by his eating half a not irreproachable Guillemot's egg. The few offerings that closed the experiment once more included eggs that were not fresh, so that they are again hardly worth detailing. A Greenfinch's egg was attacked when the Guillemot's, mixed Dove's and other eggs were being refused. A fowl's head was also refused, but beef would certainly have been eaten.

Order of preference: (1) Greenfinch. (2) Fowl and Dove, in which yolk was mixed with white. (3) Meadow-Pipit. (4) Duck, Turtle-Dove, Grey Wagtail, Pied Wagtail, Wren. Yellow-Hammer comes in (3), (4), or (5). (5) Fowl, unmixed. (6) Fowl's intestines, placed below Fowl's egg on previous night and other occasions.

Apart from the preferences, three points were interesting. These were (1) the mongoose's greater dislike for the white, seeming to show that the albumen is rather specially the carrier of the egg's defence; (2) his readiness to eat stale eggs—he even showed preferences as between species that were apparently equally stale; and, (3), a possible special repugnance to fowls' eggs as a result of having had to feed on them alone on the previous night. I have seen a similar repugnance in insectivorous birds towards an insect of which they had just been given too exclusive a supply.

All the eggs used were non-incubated.

Expt. 24. July 17.—Offered the mongoose a duck's egg. He began to lick at its contents. I withdrew it and offered a fowl's egg. He smelt and refused it. I put it down in front of him, and he gave one or two licks at it and desisted. I put a duck's egg beside it. He came forward again, smelt it, was somewhat more inclined for it, and licked into it a little; then desisted, drew back and lay down again. After this he refused to be tempted by either egg. I left each in front of him—just outside his sleeping-box door, he lying just inside—and offered (in my fingers as usual) a Guinea-fowl egg (*Numida meleagris*). He smelt it well, licked it, became intensely interested, and began to follow it out on my withdrawing it. I re-offered, in my fingers, the fowl's and duck's, and he would touch neither, but at once commenced to lick at the Guinea-fowl's. I withdrew it again, and again left the fowl and duck egg before him. He smelt each and withdrew. I then put down the Guinea-fowl egg a little distance on *my* side of the other two. These were side by side, and, with some straw he had thrown out of his box, formed a barrier between the mongoose and the Guinea-fowl egg. He at once rose and came forward, smelling the fowl and duck eggs as he did so, then leaned right over them in a very strained position, and began eagerly to lick up the Guinea-fowl's. He soon drew back, and, in doing so, actually licked and refused the fowl's egg, shaking his head vigorously, and smelt and refused the duck's; and, making quite a *détour*, came round to my side of the Guinea-fowl egg and began to lick it out in comfort. He had half finished it, or rather more, when he began to find the opening too small and tried to enlarge it. Whether because the shell was excessively hard, or for some other reason, he quitted it after licking very little more and began to lick at the fowl's egg instead, appetized thereto, as I thought, by his previous feed of Guinea-fowl's egg. I now left, leaving the three eggs in with him for the night. Actually two fowls' eggs had been used, but only one was now left in.

Expt. 25. July 18.—The Fowl's egg has been licked clean

out since last night, the Guinea-fowl's egg remains slightly more than half empty, and I cannot at present examine the duck's egg without disturbing the mongoose, as he has carried it into his sleeping-box and is lying on it. It would almost seem that the Guinea-fowl's egg proved less agreeable than its promise. All the eggs were new-laid, and in last night's experiment, as always, I broke a hole in each before offering it. In breaking I always use a separate implement (nail) for each egg to avoid transferring smells.

Expt. 26. July 26.—To-night, for the third time since the experiment of the 17th, I tested fowl's egg against Guinea-fowl's. Each time the result has been a preference for the former—just the reverse of what occurred in the original experiment.

Expt. 27. Aug. 13.—The mongoose refused a fowl's egg, and, on my leaving it in, tried it waveringly and at once withdrew. He tasted a Guinea-fowl's egg and refused it, and ignored both eggs on my putting them in with him. Shortly after he again waveringly smelt and tasted them, probably nearly hungry enough, and carried the Guinea-fowl's egg into his sleeping-place, but there at once abandoned it, and came out and remained outside, taking no notice of either egg. I therefore recovered both eggs and held each to his nose in turn. He gave a lick at each (each was, as usual, holed) and withdrew; but on my holding a fresh Bullfinch's egg to him (laid in captivity) he smelt and at once attacked it with the greatest eagerness.

I withdrew it and re-offered the other two eggs. He persistently refused both; but, on my substituting once more the remains of the Bullfinch's egg, he attacked it with as great eagerness as previously, and, when he was unable to extract anything more from it, eagerly crunched up the shell as well.

Expts. 28 and 29. Aug.—At a later date I carried out two separate experiments with another fresh Bullfinch's egg. Each time the result was: smelt and refused and tasted and refused fowl's egg and Guinea-fowl's egg, but readily ate

Bullfinch's. The eggs were, as usual, broken into by myself before being offered, in order to avoid complications through differing strength of shell.

CONCLUSIONS FROM EXPERIMENTS ON THE MONGOOSE.

No one can read these experiments, I think, without realizing that preferences of the most marked kind were shown. At the same time, the change that occurred in the mongoose's opinion of one or two eggs warns us that his "placings" in these experiments do not necessarily, in every case, represent what his final verdict on the eggs would have been had he been supplied with more abundant material. Also, the mongoose's preferences were not necessarily those that would have been shown by Palearctic eaters of eggs, though the analogy of insect-, meat-, and plant-eating vertebrates suggests that the difference would not have been great.

Still, the preferences shown are, perhaps, worth roughly tabulating. The following may be nearly correct:—

1. House-Martin, House-Sparrow, Bullfinch, Greenfinch. Beef.
2. Quite a gap. Mouse, yolks of certain eggs, incubated Black-bird, Kestrel, and Garden-Warbler. Some of the stale eggs of June 30th (as Sandpiper, Golden Plover, Grouse, Pheasant Oystercatcher) come here or higher*.
- Lesser { 3. Song-Thrush, Spotted Flycatcher, Meadow-Pipit.
- White- { 4. Hedge-Sparrow. } Domestic Duck and Turtle-Dove hereabouts.
- throat, { 5. Grey Wagtail. }
- Yellow- { 6. Pied Wagtail, Domestic Fowl.
- Hammer. { 7. Wren, Willow-Warbler, Guinea-fowl (at the last). } Great Tit.
8. Fowl, temporarily.
9. Fowl's intestines, Burnet Moth.

All these eggs, with the exceptions stated in Grade 2, were fresh and non-incubated.

The special dislike for the albumen of the low-placed eggs was of interest, as suggesting the part of the egg which

* Red Grouse "with definite eagerness" and "all I would allow" of each of the others here mentioned.

(if these views be correct) is specially entrusted with its defence—at any rate in relation to an Indian Mongoose.

The mongoose's daily food during the two months was mainly meat—raw beef (almost daily), frequent heads of chickens and ducks, young chicks, &c., that had come to an untimely end, sometimes mice and on a few days rabbit. He also received occasional insects (chiefly Noctuid moths); scraps; and an egg every night—not entirely fowls', for I had some other eggs, of doubtful freshness, that I did not use in experiment (except where specially mentioned) but utilized for food.

EXPLANATION OF PLATE XIX.

The figures of South-African eggs are intended to illustrate:—

- a. Polymorphism in Weavers' eggs and their tendency to fall into local colour-groups with unrelated eggs (i. e., *Hyphantornis jamesoni*, figs. 3, 5, 7, 9, 12, 15).
- b. The considerable pigmentation of some eggs laid in holes (i. e., *Spreo bicolor*, fig. 18).
- c. The extraordinarily close resemblances that purely coincidental variation can bring about.

Fig. 1. *Tympanistria bicolor*.

2. *Colius striatus minor*.

3. *Hyphantornis jamesoni*.

4. *Crateropus kirki*.

5. *Hyphantornis jamesoni*.

6. *Dryoscopus guttatus*.

7. *Hyphantornis jamesoni*.

8. *Laniarius quadricolor*.

9. *Hyphantornis jamesoni*.

10. *Pycnonotus layardi*.

11. " "

12. *Hyphantornis jamesoni*.

13. *Pycnonotus layardi*.

Fig. 14. *Pycnonotus layardi*.

15. *Hyphantornis jamesoni*.

16. *Pycnonotus layardi*.

17. *Anthus lineiventris*.

18. *Spreo bicolor*.

19. *Erithacus swynnertoni*.

20. *Cossypha natalensis*.

21. *Sitagra velatus*.

22. " "

23. " "

24. " *xanthoptera*.

25. " "

XXIX.—*Some Birds of Palawan, Philippine Islands.*

By WILLOUGHBY P. LOWE, M.B.O.U.

ON April 13, 1907, I accepted a pressing invitation to visit a cousin, Colonel White, who had charge of the Philippine penal colony at Iwahig, Palawan. Being himself much interested in natural history, and ornithology in particular, though having little leisure to collect, he was anxious that I should join him and make a collection of birds. I accordingly left London by P. & O. mail-boat for Hongkong, *viâ* Colombo. At Hongkong I travelled by a small steamer to Manila. On my arrival there, on May 21, I found there was no boat leaving for Puerta Princesa until June 4, so I decided to visit the great sulphur spring and baths at Sibal, Luzon, where I arrived on May 24. Here I found birds to be plentiful, and I spent such time as was at my disposal collecting. Of these birds and a few others collected subsequently on my return at Antipolo and Montalban before returning home I do not intend to include in this paper.

Leaving Manila on June 4 in a small gun-boat—the ‘Panay’—I duly arrived at Puerta Princesa three days later. Here I was met by Col. White with a launch, and proceeded up the beautiful Iwahig River to the penal settlement, where there were roughly 1000 prisoners engaged in every kind of work. The island is very fertile, and for the most part covered with virgin forest which cannot be penetrated. However, there are a good many spaces that have been cleared by convict labour, and wonderful crops are grown. It is in these clearings that most of the birds resort, as they like the fresh air and sunshine, where there is more insect-life. Certain species, however, prefer the forest, where grow giant trees of incredible size covered with all sorts of parasitic plants and entwined with a tangle of vines and creepers, and the trunks of these trees are covered with minute snails. Here is the home of the lovely Palawan Peacock-Pheasant, which never

appears to venture into the true light of day, for the sun does not penetrate his damp and lonely solitudes.

During my stay the prisoners cut a trail of some miles through the forest, and though I spent a considerable time searching, I found nothing of special interest. As is usual in working in this kind of country, I lost a large percentage of the birds shot, the undergrowth being so thick. I also did a good deal of work wading up the streams which rise on the high ground, and collecting any birds that ventured out from the forest. As the island had already been visited by various well-known collectors, there was little or no chance of finding new species. Many interesting and rare forms were, however, secured, as well as two species that had not previously been recorded from the island. This collection was later acquired by the British Museum, and as nothing has been written about the work done, I thought a list of the birds and a few notes that I was able to make might be of interest. The list contains 82 species, and is complete, with the exception of three examples of the genera *Sterna*, *Totanus*, and *Anthus*, which I have unfortunately not been able to find in the great collection in which they have been incorporated. The following birds were seen but not procured:—

Macropygia tenuirostris, *Falco peregrinus*, *Falco severus*, *Pandion haliaëtus*, and *Gymnolæmus lemprieri*.

I am greatly indebted to Col. White for all he did to help me and my work, and also for getting the prisoners to snare birds and other creatures; to Mr. Ogilvie-Grant for allowing me, during a very busy time, access to the collection; and also to Mr. Chubb and Mr. Wells in helping me to find the birds. In preparing this list I have followed the nomenclature and classification of McGregor's 'Manual of Philippine Birds.'

Megapodius cumingi.

a. ♂ ?. July 18, 1907.

An immature male, very like one collected at Puerta Princesa by Everett. I had little opportunity for studying

these birds, though the convicts reported that they were common, and they succeeded in snaring several birds, which they brought in alive. I turned them all loose except the one above enumerated. They run very rapidly.

Gallus gallus.

a. ♂ ad.

The Red Jungle-Fowl was very common, and frequently heard crowing in the early morning. They were often seen in dense forest scratching amongst the undergrowth. They also frequent the open clearings to feed on maize and other crops. At such times, if cut off from the forest, they take to wing and afford good shooting. The prisoners brought in daily live birds of all ages and sexes. The flesh, though eatable, is very tough.

Polyplectron napoleonis.

a, b, c. ♂ ad. ; *d, e, f.* ♂ juv. ; *g.* ♀ ad. ; *h, i.* ♀ juv.

The three adult males are in full plumage and show a narrow superciliary stripe. Another immature bird, which has nearly completed the moult, shows no sign of any such mark, whilst a still younger bird with a brown back mottled with green and a brown crest, has a larger and wider stripe than any of the others. A young male taken on June 29 closely resembles the adult female, but the crest is less developed and the lores are blackish. The Palawan Peacock-Pheasant, though common in the forests, is but seldom seen except by natives. On July 8 I was walking along a narrow trail with dense forest on either side, when an adult female flew across the path. A lucky snapshot through the bushes killed her. This was the only occasion I saw the bird, the others being snared and brought in alive by the convicts. Col. White told me that he had tried several times to keep these birds alive in a large wire enclosure in company with Jungle-Fowl, but they refused to eat any kind of grain and soon died. In a wild state they feed on something not unlike a small acorn, but I was never able to find the tree or bush on which it grew. The flesh is delicious and tender.

Turnix fasciata.

a. ♀ ad.; *b, c.* ♂ imm.; *d, e.* ♂ & ♀ in down.

The Philippine Button-Quail, though common in the long grass, is only put up accidentally. On June 1 I flushed an old bird right at my feet. I searched for eggs, and was rewarded by a nice pair of nestlings only just hatched.

Treron nipalensis.

a, b. ♂ ad.; *c.* ♀ ad.; *d.* ♂? juv.

These Thick-billed Green Pigeons were common in the forests. The chief peculiarity that strikes one about the fruit-pigeons is that they do not seem to sit across the branch as do most birds, but sit and walk along the branches, which, when the tree is tall and the branches moderately thick, makes them difficult to see and still more difficult to shoot. I have often seen this and other pigeons moving, snake-like, along a branch to its extremities to feed on the fruit of the wild rubber. The young bird, obtained on July 29, has only just left the nest and is lacking in feathers around the bill.

Osmotreron vernans.

a, b. ♂ ad.; *c, d, e, f, g.* ♀.

The Pink-necked Green Pigeon is abundant in and around the edges of the forest.

Leucotreron leclancheri.

a. ♂ ad.; *b.* ♀ ad.; *c.* ♀ imm.

The Black-chinned Fruit-Pigeon was noticed in moderate numbers during June and July, always in the trees overhanging the rivers and feeding on rubber fruit. As a rule they fell when shot in deep water, and owing to the presence of crocodiles had to be abandoned. The immature female lacks the dark spot on the breast, otherwise it resembles an adult.

Muscadivores palawanensis.

a. ♂ ad; *b, c.* ♀ ad.

The Palawan Imperial Pigeon is one of the most common birds. In the evenings I frequently noticed them flying

very high across the open spaces between the forest, and at such times they offer excellent shooting, though it requires some skill to make a good bag. I did not find any nests, and the birds shot showed no signs of nesting.

Spilopelia tigrina.

a. ♂ ad. ; *b.* ♂ juv. ; *c, d, e, f, g, h.* ♀.

The Malay Spotted Dove was quite common. It prefers the cultivated ground, especially banana plantations and vicinity of houses. It was not noticed in the forest.

Chalcophaps indica.

This handsome Bronze-winged Dove keeps to the dense forest, where its plumage harmonises so well that it is difficult to see. At times when I was sitting quietly beside a small stream, it came to drink in company with *Irena tweeddalii*.

Rallina fasciata.

a, b. ♂ ad.

I did not see the Malay Banded Crake, though I noticed its footmarks in the mud. These two fine males were snared by natives.

Actitis hypoleucos.

a. ? ad.

Common.

Ardea sumatrana.

a. ♀ imm.

The large Ashy-grey Heron was met with on several occasions near the mouth of the Iwahig River at low water. It was not noticed along the streams on higher ground. The one shot was feeding on fish.

Nycticorax manillensis.

a. ♀ ad. July 21, 1907.

McGregor does not mention this species as occurring in Palawan. I obtained this specimen of the Philippine Night Heron near the landing on the Iwahig River. It was perched in some trees, and was the only one seen.

Gorsachius melanolophus.

a, b. ♂ imm. ; *c.* ♀ imm.

The Malay Bittern is very common and feeds largely on beetles.

Bubulcus coromandus.

a. ♂ ad.

Very common, and seen with native cattle and water-buffaloes.

Ixobrychus cinnamomeus.

a. ?.

This was the only specimen seen of the Cinnamon Bittern.

Astur trivirgatus.

a. ♀ imm.

The Crested Goshawk seems to be rare judging by the records. I only saw one specimen late in the evening in a small opening in the forest. It was busy devouring a small bat.

Spizaëtus limnaëtus.

a. ♀ ad.

Several specimens of the Changeable Hawk-Eagle were seen. They were always along the Iwahig River and perched on a dead branch of a tree, but were by no means common.

Spilornis bacha.

a. ♂ ad. ; *b, c.* ♀.

The Malay Serpent-Eagle is tolerably common.

Haliaëtus leucogaster.

a. ♀ ad.

The White-breasted Sea-Eagle is a very common species, noticed chiefly along the coast. During the heat of the day a pair of these birds used to circle round over the forest on high ground. At first I thought they might be *Pithecophaga*, as the coloration in the distance is similar. Subsequently, on seeing *Pithecophaga* in life, I found the two birds have not the slightest resemblance to each other on the wing, the former sailing in a buzzard-like manner, whilst the latter exactly resembles a greatly-magnified

Sparrow-Hawk (*Accipiter nisus*). When viewed from below, the large fan-shaped wings, long tail, and white underparts are easily discernible. The beat of the wings is rather slow and ponderous. The specimen above-mentioned was presented to the Exeter Museum, where it has been mounted.

Cacatua hæmaturopygia.

a. ♂ ad.; *b.* ♀; *c.* ?.

The Philippine Cockatoo is one of the commonest birds on the island as well as one of the most destructive. When the corn is ripening large flocks descend and do an immense amount of harm. Late in the evenings I saw some dead trees white with the birds, and was told that they roosted there. They are said to be good eating, but I did not try them.

Prioniturus cyaneiceps.

a, b, c, d. ♂; *e, f.* ♀.

The Blue Racket-tailed Parrakeet is generally seen along the edges of the forest. Occasionally a small flock will cross an open clearing. At such times their flight is wonderfully swift.

Tanygnathus lucionensis.

a. ♂; *b, c.* ♀.

This was the first species I shot on landing. The Philippine Green Parrot is quite common, occurring in forest and near open spaces.

Eurystomus orientalis.

a, b, c, d. ♂; *e, f, g.* ♀.

The Broad-billed Roller is another very common and conspicuous bird. It is frequently observed on dead trees or tree-stumps. It was also met with in the forest. Several specimens shot had been feeding on bright green beetles, which they capture on the wing.

Pelargopsis gouldi.

a. ♂ ad.; *b.* ♀ ad.

Gould's Stork-billed Kingfisher is fairly common on the Iwahig River. I found it tame, but did not see them feeding.

Alcedo bengalensis.

a. ♂; *b.* ♀.

The Asiatic Kingfisher is common and generally distributed.

Alcedo meninting.

a. ♂ ad.

The handsome Malayan Kingfisher was only seen on the small streams on the higher ground. It was usually perched in small bushes overhanging the water, occasionally darting in after a small fish.

Ceyx euerythra.

a. ♀ ad.

The Little Red-backed Kingfisher was noticed both on the Iwahig and small streams. It spends a great deal of time plunging into the water to catch aquatic insects and small fish. I frequently noticed it in company with *Alcedo meninting*.

Halcyon coromandus.

a. ? juv.

The Ruddy Kingfisher appears to be scarce. I only once saw a specimen, and that was on the Iwahig. This young bird, which had not long left the nest, was snared by natives in the forest.

Halcyon chloris.

a. ♂ ad.

Very common. Found frequenting coco-nut plantations.

Caprimulgus manillensis.

a. ♀ ad.; *b.* ? juv.

The Manila Nightjar was only seen twice, on each occasion late in the evening. There are two specimens in the National Collection, obtained by Steere at Puerta Princesa in Sept. 1887. It is probably common, though difficult to find, as the few records show.

Collocalia fuciphaga.

a, b. ♂; *c.* ♀; *d.* ?.

Thunberg's Swiftlet is very common, and was noticed daily flying over the penal settlement and edges of the forest.

Collocalia troglodytes.

a. ♀ ad.

The Pigmy Swiftlet, though common, was frequently flying high and rather difficult to secure.

Surniculus lugubris.

a, b. ♂ ad.; *c, d, e.* ♀ ad.; *f.* ♀ juv.

The Glossy Drongo-Cuckoo is a common species, frequenting open clearings where there are scattered bushes.

Eudynamys mindanensis.

a. ♂ ad.; *b.* ♀ ad.

♂. Iris red, bill greenish yellow, legs plumbeous.

♀. Iris red, bill light horn, legs plumbeous.

The Philippine Koel is unquestionably a bird of very variable plumage. The primaries on some specimens sexed female show one wing quite dark, whilst the other is regularly barred. Whitehead's young female in dark plumage, resembling a male, is quite a young bird. Two feathers of the scapulars are slightly barred with brown. In connection with this I may mention that there is a specimen collected by Dr. Steere in Mindanao and sexed male. This is also a completely dark bird, but has new tail-feathers, not fully grown, which are barred with reddish brown. Until further material is received with the sexes correctly determined, the phases through which this bird passes cannot be finally decided. These birds are tolerably common in Palawan, very noisy and not easy to procure. I found that the easiest way to secure specimens was by keeping quiet and hidden and imitating their notes. Both birds shot were feeding on large round berries.

Centropus sinensis.

a, b. ♀ ad.

The Common Coucal is rather scarce, and I did not find it easy to procure; for, unless shot dead, it runs in the long grass, and recovery is hopeless. The female obtained on June 16 was nesting. The food consists chiefly of insects.

Centropus javanicus.

a. ♂ ad.; *b.* ♀ ad.

The Javan Coucal is by far the more common of the two species, and is usually met with in the long grass.

Dryococcyx harringtoni.

a, b, c. ♂ ad.; *d, e, f, g.* ♀ ad.

Harrington's Cuckoo is very plentiful in the forests, where it is a conspicuous bird.

Tiga everetti.

a, b, c, d. ♂ ad.; *e, f, g.* ♀ ad.

Everett's Three-toed Woodpecker is a common forest-loving species. Stomachs of these birds contained insects and minute snails.

Chrysocolaptes erythrocephalus.

a, b. ♂ ad.

The Red-faced Golden Flicker occurs only in the forests, and, whilst tolerably common, is less often seen than *T. everetti*. The stomachs all contained remains of insects.

Mulleripicus pulverulentus.

a, b. ♂ & ♀ imm.; *c, d.* ♂ & ♀ juv.

The Great Slaty Woodpecker was nesting at the time of my visit. The nest was placed half way up a live tree and about sixty feet from the ground. The site chosen was on the edge of a forest clearing. One of the young birds was only half the size of the other, though both appeared to be of the same age. The tree was cut down, and the nest and birds, which were given to the Exeter Museum, have been well mounted by Rowland Ward.

Thriponax hargitti.

a, b. ♂ ad.

This fine large Woodpecker was met with frequently on the edges of clearings and also in the forest. These two specimens agree with one obtained by Steere at Palinog-Masabate. There seems to be a good deal of variation in the wide band of light buff across the lower back in birds from the same island, some being quite whitish.

Pitta atricapilla.

a, b, c. ♂; *d, e.* ♀.

The Black-headed Pitta, though common, is seldom seen, as it prefers the dense undergrowth of the forest. Occasionally I saw it in the bed of a stream, but on the slightest alarm it took refuge in the forest. At times, when sitting quietly in the forest, one may hear it hopping about, and an odd glimpse of this lovely bird obtained. They feed on centipedes and other insects.

Hirundo javanica.

a, b. ♂ ad.; *c.* ♂ juv.; *d.* ♀ ad.; *e.* ♀ juv.

The Asiatic Swallow occurred plentifully along the Iwahig, where it nests.

Cyornis lemprieri.

a. ♂ ad.; *b, c.* ♀ ad.

Lempriere's Cyornis is a common bird in dense forest. The oviduct of a female shot on July 16 contained an egg.

Hypothymis occipitalis.

a, b. ♂ ad.; *c, d.* ♀ ad.

The Black-naped Flycatcher is another common forest-bird. On June 14 I secured a female at 800 ft.

Xeocephus cyanescens.

a. ♂ ad.

Bill, legs, and eyelids blue; inside of mouth yellow, tongue green.

I found the Large Blue Flycatcher fairly common in swampy places. Col. White found a nest in July about six feet from the ground.

Culicicapa helianthea.

a, b. ♂ ad.; *c.* ♀ ad.

The pretty little Yellow Flycatcher inhabits dense forest and is not at all easy to see.

Pericrocotus igneus.

a, b, c, d, e, f, g. ♂ ad.; *h.* ♀ ad.

This series of the Fiery Minivet were all killed on the higher ground in tall trees whilst associating with Sunbirds and Flowerpeckers. They are all in worn plumage except the female.

Ægithina viridis.

a, b, c, d. ♂ ad.; *e, f, g.* ♀; *h.* ?.

The Black-winged Iora occurs plentifully, and its bright yellow plumage renders it conspicuous. All the specimens are in nice fresh plumage.

Chloropsis palawanensis.

a, b, c, d. ♂ ad.; *e.* ♀ ad.

The pretty Palawan Leafbird, though common on the island, was only noticed in the clearings where isolated bushes have grown up. Here it may be seen feeding on small fruits, in company with the small Black Cuckoo (*Surniculus lugubris*). It is difficult to skin, as the feathers fall out on the slightest touch.

Irena tweeddalei.

a, b, c, d, e, f. ♂ ad.; *g.* ♂ imm.; *h, i, j, k.* ♀ ad.

Tweeddale's Fairy Bluebird is one of the commonest as well as one of the most beautiful birds occurring in Palawan. It is found chiefly on the higher ground along the streams; here it keeps to the dense-foliaged trees and bushes, feeding on greenish berries and other fruit. The young male, shot on June 22, is in a very interesting stage of plumage, changing from that of the female to that of the male. Bright blue is appearing on the upper surface, particularly on the upper tail-coverts; whilst the throat is mottled with black and the under tail-coverts are blue as in the adult.

Microtarsus melanocephalos.

a, b, c, d, e. ♂ ad. ; *f.* ♂ juv. ; *g.* ♀ ad.

The handsome Black-headed Bulbul is tolerably common, occurring in the forests and feeding on berries.

Trichophorus frater.

a, b, c. ♀ ad.

The Grey-throated Hairy Bulbul is another fairly common species, and was met with in the forests.

Trichophorus palawanensis.

a, b, c, d. ♂ ad. ; *e, f.* ♀ ad.

Another very common bird, found feeding on fruit in the forests.

Pycnonotus cinereifrons.

a, b, c, d. ♂ ad. ; *e.* ♀ ad.

The Ashy-fronted Bulbul occurs plentifully along the streams, feeding on insects, small fruits, and berries.

Anuropsis cinereiceps.

a. ♂ ad.

The Ashy-headed Wood-Babbler appears to be very rare. I only saw the specimen obtained. It might be easily overlooked, for it creeps about in dead brush and fallen tree-tops which have become overgrown with grass. Had I not been climbing through this tangle I should not have seen it. There are six examples of this species in the National Collection—five males and one female (Everett's type), which latter, when compared with the males, seems to differ slightly by being paler on the upper surface.

Mixornis woodi.

a, b, c, d, e. ♂ ad. ; *f, g.* ♀.

The Palawan Tit-Babbler occurs in thick bush, and appears to subsist entirely on insects. It is one of the commonest birds and has a harsh note.

Kittacincla nigra.

a, b, c, d, e. ♂ ad. ; *f.* ♀ ad.

McGregor states that the adult male and female are alike.

There is, however, a considerable difference between the sexes, the female being paler throughout and having more white on the abdomen. Paired birds were frequently seen, and the sexes are easily distinguished in the field.

The Palawan Black Shama is common in the undergrowth of the forest, and is, on account of its lovely song, pied plumage, and graceful appearance, one of the most attractive birds on the island.

Locustella ochotensis.

a. ♂ ad.

The Yellow Grasshopper-Warbler does not appear to have been previously recorded from Palawan, where it occurs on migration. This specimen was found in a patch of sweet potatoes.

Orthotomus ruficeps.

a, b. ♂ ad.

The Rufous-headed Tailor-bird is another very common species, which I found, in company with *Micornis woodi*, hunting in the dense bushes for insects.

Artamus leucorhynchus.

a. ♀ ad.

Although I saw numbers of these birds in Luzon perched on telegraph wire and poles—and it occurs plentifully on most of the islands—the White-bellied Swallow-Shrike is nevertheless very scarce in Palawan. I only saw one pair, near the penal settlement. It feeds after the manner of a Bee-eater, and prefers the open ground where there are dead trees.

Pardaliparus amabilis.

a. ♂ ad.; *b.* ♂ juv.; *c.* ♀ ad.; *d.* ♀ juv.; *e.* ?

The specimens here enumerated of the Palawan Titmouse are a family which I found in a swamp along the Iwahig River. They were at the time being fed by their parents. It does not appear to be common, as it was the only occasion on which I met with the species.

Callisitta palawana.

a. ♂ ad.; *b, c, d.* ♀ ad.

The handsome little Palawan Nuthatch is fairly common in the forests, usually in company with other birds.

Dicaeum pygmaeum.

a. ♂ juv.; *b.* ♀ juv.

The Pygmy Flowerpecker was noticed in the coco-nut plantations hunting for minute insects, on which it feeds. It was by no means scarce and was observed daily.

Prionochilus johannæ.

a, b. ♂ ad.; *c.* ♂ juv.; *d, e, f, g.* ♀ ad.; *h.* ♀ juv.; *i.* ?.

The Palawan Flowerpecker always forms a part of the "bird parties" that go trooping through the forest searching for insects. It is an extremely pretty little bird and very common.

Chalcostetha calcostetha.

a. ♂ ad.

The pretty Copper-breasted Sunbird is not plentiful. A few birds were seen along the Iwahig River. They were shy and frequented the swamps, and, when shot, were difficult to recover.

Æthopyga shelleyi.

a, b, c, d, e, f. ♂ ad.; *g, h, i.* ♀ ad.

Shelley's Sunbird is very common, but was found more plentifully on the higher ground in thick forest-trees. It is a very pretty and sociable little bird, and was never observed except in company with other birds.

Cinnyris sperata.

a, b, c. ♂ ad.; *d.* ♀ ad.

The very beautiful Red-breasted Sunbird is common, and was found in the forest on both high and low grounds.

Cinnyris aurora.

a, b. ♂ ad.; *c.* ♀ ad.

The Orange-breasted Sunbird is the commonest species on the island.

Anthreptes malaccensis.

a, b, c, d, e, f. ♂ ad.; *g.* ♂ juv.; *h, i.* ♀.

The Brown-throated Sunbird occurs plentifully along the Iwalig River. It seems to prefer the damp ground. The two females are grey above, with a yellowish-green wash on rump and wings. The under surface is grey washed with yellow; the breast and abdomen bright yellow.

Arachnothera dilutor.

a. ♀ ad.

The Pale Spider-Hunter seems to have been recorded only from Palawan, where it is not plentiful. This specimen was shot whilst feeding in a vine-covered bush along a small stream on the higher ground. It was also noticed in the mangroves.

Munia jagori.

a. ♂ ad.; *b.* ♀ ad.

Small flocks of the Philippine Weaver—from twenty to thirty birds—were seen in the long grass feeding on the ripe seed. Adults and young in brown dress were seen together on June 12. The adult male differs from the female in being of a deeper and richer colour throughout.

Oriolus xanthonotus.

a, b, c, d. ♂ ad.; *e, f, g.* ♀ ad.

The Black-headed Oriole was noticed in the forest, where it is quite plentiful, and may be seen climbing up the various vines in a Woodpecker-like fashion. All birds shot in June and July were feeding on insects.

Chibia palawanensis.

a, b, c, d, e. ♀ ad.

A very common Drongo, seen chiefly along the edges of the forest.

Buchanga palawanensis.

a, b. ♂ ad.; *c.* ♂ juv.; *d, e.* ♀; *f.* ?.

Irides red, rarely brown.

As McGregor says, Whitehead was mistaken about the colour of the eyes, and the other points of difference seem of

little value, as the birds differ so much in size and coloration, some being black over the nostrils and others quite pale. As to wing-measurements, there seems a little difference, but one of my specimens has a wing quite as large as one marked *B. leucophæa*. All my birds are in worn plumage, which gives them a mottled appearance.

Lamprocorax panayensis.

a. ♀ ad. ; *b.* ♂ juv.

The Philippine Glossy Starling is plentiful. The young bird had fallen from the nest at the foot of a dead tree. It was unable to fly.

Eulabes palawanensis.

a, b. ♂ ad. ; *c, d.* ♀ ad.

The Palawan Wattled Myna is a common and conspicuous bird. It was noticed in pairs, and generally found where there was dead timber standing.

Corvus pusillus.

a. ♂ ad.

This is a curious little Crow, having a voice like a frog. It was very common, particularly near the Iwahig landing.

XXX —*The Bird-Caves of the Bermudas and their Former Inhabitants.* By Dr. R. W. SHUFELDT, Washington, D C.

(Plate XX.)

EARLY in the month of August, 1915, Dr. F. A. Lucas, Director of the American Museum of Natural History of New York City, invited my attention to the fact that there was, at that time, an interesting collection of fossilized bones of birds from the Bermuda Islands at that institution, which stood in need of study and description ; he desired to know if I would give them the required attention. This invitation I was glad to accept, as it opened up for me research along a line in which I had never before been engaged, and in due course the material—a most valuable

lot of specimens—was sent to my Washington home for examination; it included a small lot that had been collected a few years previously by Mr. Louis L. Mowbray, who is now attached to the New York Aquarium of New York City.

Hardly had I made a superficial examination of this famous collection, when it was amplified through the courtesy of Mr. Edward McGall, of Orange, New Jersey, who very generously added his private material, of the same character, to that which Dr. Lucas had already sent me; indeed, Mr. McGall was the fortunate one who had collected all these interesting specimens, apart from the few Mr. Mowbray had obtained. Both explorers had secured their finds first-hand in the almost inaccessible and very beautiful Bermudan caves.

As it did not appear to be at all likely that any new additions would be made to what I now had on hand, I gave the series a fairly thorough investigation; and I was satisfied that all the bones—there was a long string of them—belonged to various sea-birds, apparently to such forms as we know as Shearwaters and Petrels. In addition, I found one or two shells, examples of which are still to be found on these islands in great numbers. Finally, I found the fossilized claw of a crab, which, although found elsewhere on the Atlantic seaboard, was not known to have ever occurred in Bermuda. This constitutes a beautiful example of that class of cases where a harmless and inconspicuous animal will, for some unknown reason, become entirely extinct over enormous areas, and still remain in existence in others.

These Bermudan caves are very recent in their formation; they certainly are not, at the very limit, more than five centuries old, and maybe a century or so less. My particular interest centred about the unravelling of the history of the famous bird long known by the name of “Cahow” and by several other names, which are not necessary to enumerate here. At one time the “Cahow” was extremely abundant on these Bermuda Islands, and bred there in

untold millions at the time of the early settlers, some three centuries ago. It was a nocturnal species, possessing discordant notes; and so fearless of man were these birds that they would alight on the head, shoulders, and arms of any person visiting their breeding-grounds. This unusual fearlessness resulted in the final extermination of the species; for the first inhabitants of the islands, and those that followed them in a comparatively short period, utterly destroyed the birds for food, notwithstanding their enormous numbers. All this has now become a matter of history, and one of the most extensive contributors to it is Prof. Addison E. Verrill, of the present faculty of Yale University. There are a great many writers on the subject, and most of them firmly believe that the Cahow was a Shearwater of the genus *Puffinus*; in other words, that it was a bird still to be found on the Atlantic Coast, and known as Audubon's Shearwater (*P. lherminieri*). Others, however, doubted this, and believed the bird to be an extinct Petrel; and there were other opinions in regard to the matter, all of which have been fully set forth in my memoir on the subject, which will presently be published by the American Museum of Natural History. A little further on in this article I shall refer again to these Bermudan birds; but I first desire to give a brief account of the caves themselves, and the difficulty that attended the collecting of the subfossil bones which were sent to me for description.

It is more than likely that a number of these caves still remain to be discovered, while a few, which are known to exist, are so inaccessible that no known explorer has ever ventured to get into them. Even the one in which Mr. McGall found the bird-bones he secured, could only be entered under almost insurmountable difficulty. By means of ropes, and at the imminent risk of his life, he was at last rewarded by being able to tread where no man had ever trod before, and to view scenes that no human eye had previously rested upon. For those who love adventure and yearn to accomplish such feats as this, there is still plenty of opportunity, in some of the islands of Bermuda, to

gratify the craving, and to enjoy the discovery of material entirely unknown to science.

Mr. McGall did some beautiful work, and had some narrow escapes in these caves; he visited no fewer than eight of them in all. In the one in which he found the fossil bird-bones, the floor was formed of decomposed coral, which had thoroughly dried out, and it was due to this fact that the bones had been so well preserved. In many places the coral has crumbled, and in this sort of sand we find the bones in an excellent state of preservation. Overhead, the roof is thickly festooned with dead stalactites of various lengths. One of these, which I have examined, is of a dull clay colour, rough and brittle, and has the appearance of being composed of agglutinated, coarse sand. Most of the caves—this one among the number—are very dry; while in the wet and moist ones no bones were discovered. In the latter, as a rule, both stalactites and stalagmites were growing—that is, they were increasing in size from the mineral or other products in the drippings. Where Mr. McGall found bones, he did what all collectors do not invariably do: he took the trouble to pick up every little bone he could find, however insignificant it appeared, and this very greatly assisted me when I came to study the skeletons.

Mr. Mowbray, who has an equally interesting story to tell, first found bones in the Crystal Cave, some time in 1807. One year later he presented some of these bones to the Smithsonian Institution, with the view of having them identified. He, too, was under the impression that the major portion of the bird-bones found were those of *Puffinus obscurus*: while in Bassett's Cave he collected a perfect skull and beak of Strickland's Shearwater (*P. stricklandi*), the specimen being covered with calcite, brought down by the drippings in this grotto. He also obtained a living specimen of Peale's Petrel (*Æstrelata peali*), which was, perhaps, the first specimen ever secured by science on this side of the Atlantic. After this bird died it was

preserved for the Boston Museum of Natural History, where it now is.

In one of the three stalactites collected by Mr. Mowbray in Crystal Cave, he discovered three feathers embedded about an eighth of an inch in the calcite, one of which was brown and the other two white. With respect to these, Mr. Mowbray wrote me on the 10th of February, 1916: "The finding of these feathers, agreeing in colour with the description of the early writers that the Cahou was russet and white, and the skull differing from those of the Shearwater, convinced me that the find was a good one and without question the long-looked for Cahou."

When my above-mentioned work on the Cahow appears, there will be found in it a full discussion of these "russet feathers," and of the hazy idea the early writers had of that colour. Then, too, the fossil bird-bones from Bermuda, turned over to me for description, go to prove that the extinct Cahow was a Petrel and *not* a Shearwater at all.

Birds of the latter group, according to Mr. Mowbray, are still breeding on certain of the Bermuda Islands—*Puffinus obscurus* among them; they lay their eggs at the end of February and early in March. Two of these localities are, I believe, known to Mr. Mowbray alone; he proposes to keep the secret, and allow these much-persecuted birds to breed in peace and safety.

Crystal Cave was discovered in a peculiar and interesting manner. It seems that the property, on which the entrance to it occurs, is owned by a negro named Gibbons. One of his sons and some other negro boys were playing ball one day on this land, when the ball rolled down a big hole that had not previously been noticed by them. Mr. Mowbray says: "This hole, no doubt, was opened up as an air hole, caused by the rise and fall of the tide in the cave, and was not the entrance by which the birds entered. That entrance must have been closed by subsidence." This Gibbons boy crawled into this newly discovered entrance after his ball, and when once inside he soon espied the calcite formations

within the cavern. A few days later he returned to the place ; broke off several of the stalactites, and carried them to the Bermuda Museum with the hope of selling them. Mr. Mowbray at once recognized that the specimens were of an exceptionally fine type, so he planned a trip to this new cave for the purpose of exploring it more or less thoroughly. He says: "It turned out to be a cave of enormous proportions for a Bermuda cave. While looking around, I found the skull of a rat, the skull of a bat, and some bird-bones. On swimming across the lake to the other side of the cave, I discovered embedded in the calcite the leg-bones of a bird. On careful examination, I located a number of others, some three or more inches in the calcite floor. I decided to return and remove them : and in two or three days after the first visit, which was the second day of May, 1907, I removed the bones, and made some photographs of myself removing the bones and showing the interior of the cave."

Through Mr. Mowbray's kindness, I am enabled to reproduce two of his photographs—the ones he speaks of—as illustrations to this article (Pl. XX.). The upper one shows the entrance to the new cave described in the last few paragraphs, while the lower one gives a view of its interior, with Mr. Mowbray at work cutting out the bird-bones from the calcite floor. Doubtless there are a great many very interesting and important discoveries yet to be made in this beautiful cavern ; and it will well repay some good, scientific explorer to thoroughly investigate it, with the view of obtaining some of this valuable material for scientific description and comparison. Mr. Mowbray and Mr. McGall have done their share ; now let someone else try a hand.

It took several months of steady work on my part to write up these collections, and to describe and photograph all the bird-bones sent me for the purpose. As I have remarked above, all the bones examined by me were of birds, and they were either Shearwaters or Petrels. The famous "Cahow" proved to be a new Petrel instead of a well-known species of Shearwater ; and the material

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MENPES PRESS, WATFORD.

CRYSTAL CAVE, BERMUDA.

1. The Entrance.

2. The Interior.

examined by me to prove this was so perfect and so abundant, that it left not a scintilla of doubt on the subject. There were also represented two new Shearwaters, both belonging to the genus *Puffinus*, of which there is quite a number in our fauna at the present time, but no one of them so small as one of the two I described as coming from the caves of the Bermudas. I am firmly convinced that there is a good deal of interesting osteological material in those caves, awaiting the search of the next intrepid explorer, who may be able to enter those which have been hitherto unexplored.

ADDENDUM.

As this brief article was about to go to press, several things happened which inclined me to add a page or two to it, in order that the whole might be more complete and up to date.

In the first place, I have received one or two very interesting and kind letters from Mr. Richard Higgins Burne, Curator of the Osteological Section of the Royal College of Surgeons of England, London; it affords me great pleasure to thank him here for these, and for the very important and useful sketches and photographs he made for me of skulls and skeletons in the collection of which he has charge. These were of various tubarine birds, examples of which I could not obtain in this country, and which materially aided me in diagnosing the new species I had to describe in the above-named memoir.

Owing to the fact that the latter cannot now appear for an indefinite length of time, for reasons given me by the Director of the American Museum of Natural History, I have thought it no more than fair to that museum, to the collectors of the material, and to myself and other avian paleontologists, that I should incorporate a few paragraphs here, setting forth descriptions of the new species of birds, which I found represented in the collection by their skeletal

remains, publishing them in advance of the memoir as a whole. In doing this, it will not be necessary to publish any of the plates I have prepared to illustrate the bones of these new species, as they—there are many of them—will all appear in due course in the aforesaid memoir, which required many weeks of daily and continuous labour to complete.

The material for the new species, descriptions of which are given below, belongs chiefly to the collectors and to the American Museum of Natural History of New York City—possibly it may now all be in the hands of the latter institution. The borrowed material which I used for comparative purposes came from numerous sources, and it is fully acknowledged elsewhere.

Puffinus mcgalli, sp. nov.

Recent Epoch.

(Figured in the original memoir on pl. vii. fig. 29, and pl. viii. fig. 36.)

Based on an almost perfect *sternum* of an adult individual discovered in the bird-bone caves of Bermuda.

Upon comparing this sternum with the sterna of other Shearwaters, it at once becomes evident that it belonged to a species of *Puffinus* of moderate size, and probably possessed characters in its skeleton agreeing, in all respects, with those of that genus, as the osteological characters of all known typical members of this group of birds are in close agreement, the mere matter of *size* being all we have, in some instances, to distinguish them. This being true—the material before us for comparison being in sufficient quantity and the sexes and ages well represented—this matter of *size* must be given due weight in the matter of determining new species, whether these species be existing and new to science, or extinct and heretofore undescribed.

This sternum belonged to a bird that in life was considerably larger than the existing *Puffinus lherminieri*, as the length of this bone in the former measures, from the anterior tip of the manubrium to the extreme posterior point of the mid-xiphoidal process, 5·8 centimetres, while

in the latter this line or distance equals but 4·4 centimetres. From apex to apex of the coracoidal processes, *P. megalli* measures 3·3 centimetres, and *P. therminieri* but 2·5 centimetres.

Upon comparing this sternum with the sternum of *Puffinus major* (No. 18076, Coll. U.S. Nat. Mus.), the latter is seen to be a species very considerably larger than the one here being described. I have also compared it with the sterna of *Puffinus creatopus*, *P. borealis*, *P. griseus*, and others, but it departs more or less from all of them.

In the collection of the U.S. National Museum, there is a Shearwater (No. 19385) labelled "*Puffinus gavia*, San Diego, Cal." Sharpe, in his 'Hand-list' (vol. i. p. 124), restricts the range of this species to "New Zealand and Australia." It is not listed in the A.O.U. Check-List (1910). This "*P. gavia*" was a bird of almost exactly the same size as *Puffinus megalli*, and its sternum, measured as above, has a length of 5·6 cm., while its width, measured as above, equals 3·45 cm. It is not at all likely that the sternum here under consideration belonged to an individual of that species—that is, it did not belong to a *P. gavia*.

Sometimes the plumage and other external characters of species of the same genus of birds of the same size are strikingly different, while the skeletons of any two of those species may be *indistinguishable*. There is no reason to believe but that this may have been true of any two species of *Puffinus*—the two species compared being of the *same size*. For example, one would have to be very expert indeed in order to be able to distinguish the sternum of a specimen of *Dendroica coronata* from the same bone taken from a specimen of *Dendroica auduboni*—age and sex in the two individuals being the same. Had we skins of these two species, however, there would be no difficulty in identifying them, and pronouncing at once as to which was which. This is the case with respect to the bones of the skeleton of a great many birds of the existing avifauna; still, the expert osteologist, who may have been a constant student of the subject for a lifetime, and who has handled large

quantities of material, can, in nearly all cases, make correct diagnoses and references which would be impossible for one not having had such training and experience.

The extinct species of *Puffinus* here described is named after Mr. Edward McGall, in recognition of his success in obtaining this valuable collection of fossil bird-bones from Bermuda.

Puffinus parvus, sp. nov.

Recent Epoch.

(In the original memoir, the bones of this extinct species are figured on pl. ix. figs. 43-45; pl. x. figs. 55-56; pls. xi., xiii. figs. 101, 107, 121, 122, and 123.)

There is abundant evidence pointing to the fact of the existence of a small Shearwater, now extinct, that formerly was abundant in the Bermudan tubinarine assemblage of birds. This evidence rests upon the occurrence in the collections before me of many subfossil bones that belonged to various individuals representing it. For example, in that part of the collection belonging to the American Museum of Natural History, at the time I was at work upon the material, there were the following specimens, namely, a cranium (more or less imperfect), an ulna, a radius, a carpo-metacarpus, part of a sternum, four ossa innominata, a femur, a tibio-tarsus, and a metatarsus; while in the McGall collection I found five perfect humeri, three ulnæ, a radius, a carpo-metacarpus, a proximal joint of an index digit, a coracoid, an inferior mandible, an imperfect os furculum, a tarso-metatarsus, an os innominatum of the left side; subsequently, there also came to light an imperfect cranium. All of this material is described in great detail in my memoir, and I have compared it, character for character, with the bones of skeletons of all the Shearwaters and other forms that I could bring together from private and public collections in America and England.

These bones belonged to a Shearwater (*Puffinus*) smaller than Audubon's Shearwater (*Puffinus lherminieri*)—that is, smaller than any Shearwater in our present Atlantic Ocean

avifauna. Their characters all go to indicate that the bird was a typical *Puffinus*, one wherein the *sternum* was of the *short* variety, as in *Puffinus creatopus*; in other words, the body of the bone was not elongate, as it is in several of the *small* existing Shearwaters in various parts of the world.

Taken together, the bones representing this new and doubtless extinct species of *Puffinus* belonged to three or more different individuals—a conclusion I came to after carefully comparing and matching them.

We have no evidence based upon fossil or subfossil material, and no evidence based upon osteological material representing existing species of *Puffinus*, that there now exists or ever existed a typical Shearwater of this genus that was as small or smaller than it: hence I have bestowed upon it the specific name of *parvus*; and, as pointed out above, there is no doubt whatever but that the bird was a true *Puffinus*, as all the characters of the bones representing it indicate this, agreeing, as they do, with but slight specific variations, with those in the skeletons of its relatives now in existence.

Æstrelata vociferans, sp. nov.

(Extinct.)

Cahow, Bermudan Cahow or Noisy Petrel.

At the time I was at work upon my memoir, there was before me a large series of subfossil bones representing this extinct species and many individuals of both sexes. Naturally, then, a large part of my work was devoted to the discussion of this now extinct species. Upwards of one hundred figures on plates illustrate its osteology, while my reasons are given for retaining the name *Æstrelata* instead of the more correct one, in so far as spelling goes, of *Cestrelata* in use elsewhere.

The specific name *vociferans* explains itself; for this extinct species, long known as the "Cahow," was a very noisy bird in life, judging from all the accounts we have of it left us by the early writers.

It will be noted from what I say in my still unpublished memoir, so often referred to above, and which was long ago read at a regular meeting of the New York Zoological Society, that I was the first to demonstrate, through the assistance of abundant material, that the famous "Cahow" of literature was a Petrel (*Æstrelata*) and not a Shearwater (the "*Puffinus obscurus*" of ornithological and popular literature).

In order to establish this species here, it will be necessary to quote the following few paragraphs from my memoir, to wit: "It has long been a question among ornithologists as to whether the famous 'Cahow' was a Shearwater ('*Puffinus obscurus*'?) or a Petrel (*Æstrelata*). In so far as my observation carries me, there is at least one character in the skeleton by means of which we can, with certainty, distinguish from each other these two different kinds of birds. This character is seen in the form of the *cnemial process of the tibiotarsus*. In the genus *Puffinus*—and possibly in some of its near allies—the cnemial process of the tibiotarsus is conspicuously elongate, as we see it in the Grebes and Loons; while in the Petrels it is notably shorter, with rounded superior margin. These differences are well shown in the bones figured on pl. xii. (figs. 116–125 inclusive). Judging from this character, too, such forms as *Pelecanoides urinatrix* and *Procellaria cooki* are more closely related to the Petrels than to the Shearwaters of the genus *Puffinus* (see pl. iv. fig. 20, and pl. v. fig. 21). Judging from this character alone, there is no question but that the 'Cahow' of the Bermuda Islands was an *Æstrelata* and not a *Puffinus*. This fact is sustained by other osteological as well as external characters found in the representatives of the two genera in question. For example, both the horny sheaths to the mandible, as well as those parts in the dried skulls when deprived of the sheaths, are positively diagnostic with respect to these two groups of tubarine birds. The differences in the external forms of the beaks are well shown in figs. 128–130 of pl. xvi. of my quoted

contribution, fig. 128 giving the beak of a typical Shearwater, and figs. 129 & 130 those of Petrels of the genus *Æstrelata*. I am of opinion that *Æ. vociferans* was closely related to *Æ. caribbea* (fig. 129), as I have attempted to show upon a previous page of the memoir.

“The differences in the osseous mandibles of a Petrel (*Æstrelata vociferans*) and a Shearwater (*Puffinus lherminieri*) are easily appreciated upon comparing those parts in figs. 5 & 6 of pl. i. All Petrels and petrel-like birds possess osseous beaks or mandibles, such as we find figured in figs. 1-5, pl. i. ; in fig. 11 of pl. iii., as well as in Cook’s and the Diving Petrels.

“The *tarso-metatarsus* is generally long and slender in the Petrel-like forms ; shorter and stouter in the Shearwaters. (See the various figures of this bone on my plates.)

“The ‘Cahow,’ then, was a Petrel of the genus *Æstrelata*; and with this point settled, I can proceed to give an account of its skeleton.”

A full account of its osteology here follows in my memoir, which some day will doubtless be published.

EXPLANATION OF PLATE XX.

Upper figure : The entrance to Crystal Cave, Bermuda.

Lower figure : Mr. Mowbray at work in the interior of Crystal Cave.

XXXI.—*Eider Duck on the Ythan.*

By Brig.-General H. R. KELH, M.BAM.O.U.

THE river Ythan flows into the North Sea between Aberdeen and Peterhead. The coast there is very wild. Along the shores are sandhills, bordered inland by stretches of rough heather—a country very interesting to the naturalist, as it teems with bird-life.

In the spring months the chief feature of the Ythan Estuary is the enormous number of Eider Duck : hundreds of them, male and female, congregated on the sands or

sitting in dozens by the side of the river, were so tame that they allowed me to row to within ten or fifteen yards of them before they would move, and then flew only a few hundred yards before again settling. The males are very conspicuous in their black and white plumage and curiously marked heads, but the dark brown females from a short distance look like stones along the water's edge.

All day they keep up a ceaseless gabbling noise and mournful crooning, which I can only compare to the sound of people talking some distance away. During May they breed in great numbers among the coarse grass on the sand-dunes, or in the patches of heather, within easy reach of the river. The nests, with the usual lining of eiderdown, contain from four to five eggs of an olive-brown colour; and, I regret to say, a very large number are taken by lads from the neighbouring villages, also by people who ought to know better: one of these had a basketful, and when I suggested that there is such a thing as the "Wild Birds Preservation Act," replied: "No one bothers about that up here, and the eggs are very good eating."

My boatman said that the female does not sit until her full complement of eggs is laid, and that "they are verra warm burds" as he put it; and, once they begin to sit, the great heat from their bodies, helped by the warmth of the sandy surroundings, very quickly hatches out the young. The first I saw this year was on the 3rd of June: two, if not three, broods of newly-hatched little black balls of fluff swimming about with their mothers in a party of ten or fifteen.

My boatman also informed me that formerly all the Eider Duck, male and female, disappeared in the autumn, but that during the last three or four years a few have remained throughout the winter; adding that, as soon as all the young are out, the males depart and are seen no more, leaving their families to be looked after by the mothers—much like paterfamilias, who sometimes seeks a change from his domestic ties and migrates to the Metropole, Brighton, or to Carlsbad for an imaginary attack of gout!

Sheld-Duck, Terns, and Oystercatchers were also breeding about the Ythan—the Sheld-Duck in holes and rabbit-burrows, the others on the shingle, as a rule further up the river.

The Terns were in hundreds about the estuary, hovering hawk-like, and then darting with a splash down into the river after the myriads of young sand-eels, which, with sea-trout below and the birds above, had a poor time. I noticed many young Terns being fed by the parents; so they apparently nest during May. They seem to feed almost from daylight till dark, except during certain stages of the tide, when apparently the young eels are not plentiful; then the birds rest in flocks on the sand-banks, or mussel-beds, exposed by low water—which reminds me that the Eider Duck also seems to feed on the small mussels.

Among other birds I have noticed are Curlew, Red-shanks, Ringed Plover, and Herring-Gulls, and I am informed that the Black-backed Gulls sometimes breed in the neighbourhood.

XXXII.—*Obituary.*

JOHN ALEXANDER HARVIE-BROWN.

The ranks of Scottish naturalists have suffered a great loss by the death of Dr. Harvie-Brown, who died on July 26 last, at the age of 72. In early life a very active man and a keen sportsman, he travelled widely, but of late years he has been unable to move about and is therefore little known to the younger generation of ornithologists.

Born at Dunipace House in Stirlingshire (where he died) in August 1814, he was the only son of John Harvie-Brown of Quarter and Shirlarton and Elizabeth, daughter of Thomas Spottiswoode of Dunipace. He was educated at Merchiston and subsequently at Edinburgh and Cambridge Universities. At Cambridge he became acquainted with Professor Newton, with whom he remained on intimate terms until the death of the latter in 1907.

In 1871 and 1872 he visited, in company with the late

Edward Alston, Norway and the Delta of the Dwina and the White Sea, and in 1875 he accompanied Henry Seebohm to the valley of the Petchora River. A complete account of these journeys are to be found in his 'Travels of a Naturalist in Northern Europe,' published in 1905.

In a small yacht, which he had specially built for the service, he made cruises for many summers accompanied by ornithological and scientific friends, round the coasts of Scotland, visiting the remoter islands, stacks and skerries, many difficult of access, and thus acquired an accurate knowledge of the fauna of these outlying parts of Scotland, of which full use was made in the series of faunal works.

The first volume of the series, "The Fauna of Sutherland," published in 1887, and several succeeding ones were written in collaboration with T. E. Buckley, one with the help of H. A. Macpherson (both of whom predeceased him). Altogether eleven volumes were issued, the last being the "Fauna of the Tweed area," written by Mr. A. H. Evans and published in 1911, who previously in conjunction with Buckley wrote the one relating to the Shetlands.

Harvie-Brown also contributed a large number of papers and short articles to the 'Zoologist,' the 'Annals of Scottish Natural History' subsequently renamed the 'Scottish Naturalist,' of which he was for many years joint-editor, and to the 'Proceedings' of the Royal Physical Society of Edinburgh and the Natural History Society of Glasgow. In 1873 he was elected a Member of the B. O. U. and contributed to 'The Ibis' a number of papers, a list of the more important of which is here given.

The subject of migration was one which for many years occupied much of his attention and entailed an immense amount of correspondence. It was due partly to his initiation and mainly to his co-operation that a scheme was developed by a committee of the British Association for enlisting the services of the men in charge of lightships and lighthouses to record observations and collect the wings of birds striking the lanterns. The first report of this series, for the autumn of 1879, was published in the 'Zoologist,'

and was compiled with the help of the late John Cordeaux, who was responsible for the portion relating to the east coast of England, while Harvie-Brown undertook the collection of statistics for the east coast of Scotland. Subsequently annual reports were issued separately for eight years, culminating in the admirable digest of the whole prepared by Mr. Eagle Clarke and published in 1912. He was also responsible for the English translation of Gätke's 'Heligoland' and himself prepared the preface to the edition of 1895.

In January 1897 a great calamity occurred to Harvie-Brown, when the greater part of Dunipace House was destroyed by fire and all the valuable collections of birds and eggs, together with those of his friend Col. Feilden, were lost as well as many other valuables. Luckily the library was contained in a separate wing which escaped destruction, but the collections could never be replaced.

Harvie-Brown was J.P. for Stirlingshire and a Fellow of the Royal Society of Edinburgh, Fellow of the Zoological Society of London, and an Hon. Life-Member of the American Ornithologists' Union. In 1912 he received the honorary degree of LL.D. from the University of Aberdeen in recognition of his contributions to the knowledge of the Scottish Fauna. He was also awarded the gold medal of the French Acclimatization Society for his memoir on the Capercaille in Scotland.

Harvie-Brown was a prolific author and his publications extended over a period of nearly fifty years. His first ornithological paper was one published in the 'Zoologist' for 1866 on the birds of his native place, Dunipace in Stirlingshire. The last we have noticed is one on the "Past and Present Distribution of the Fulmar," published partly in the 'Zoologist' and partly in the 'Scottish Naturalist.'

In the list appended are included only the more important papers which appeared in 'The Ibis' and the works separately published:—

Notes from Archangel (with E. R. Alston). *Ibis*, 1873, p. 54.

On the Birds of Transylvania (with C. G. Danford). *Ibis*, 1875, pp. 188, 291, 412.

- On the Birds of the Lower Petchora (with H. Seebohm). Ibis, 1876, pp. 105, 215, 289, 434; 1877, p. 392.
- The Capercaillie in Scotland. Edinburgh, 1879.
- A Vertebrate Fauna of Sutherland, Caithness and West Cromarty. A Vertebrate Fauna of the Outer Hebrides. A Vertebrate Fauna of the Orkney Islands. A Vertebrate Fauna of Argyll and the Inner Hebrides. A Vertebrate Fauna of the Moray Basin. (All with T. E. Buckley.) 6 vols. Edinburgh, 1887-1895.
- A Fauna of the North-west Highlands and Skye (with Rev. H. A. Macpherson). Edinburgh, 1904.
- A Vertebrate Fauna of the Tay Basin and Strathmore. Edinburgh, 1906.
- Reports on the Migration of Birds in the Spring and Autumn, 1879-87 (with J. Cordeaux and others). Edinburgh and London, 1880-89.
- Naturalist's Map of Scotland (with J. G. Bartholomew). Edinburgh, 1893.
- On a correct Colour Code or Sortation Code in Colours. Edinburgh, 1899.
- Travels of a Naturalist in Northern Europe. 2 vols. London, 1905. 8vo.

BOYD ROBERT HORSBRUGH.

With deep regret we have to record the death of Major (Temporary Lieut.-Col.) Horsbrugh at his home, Tandridge Priory, near Oxted, Surrey, on July 11 last. He was invalided home from the Front at the end of November last year, and in December underwent a severe operation for pressure on the nerves of the eye; though much better in the spring of this year, another operation became necessary, from the effects of which he was unable to make a recovery.

Major Horsbrugh was the son of the late Capt. Charles Bell Horsbrugh of the 2nd Central India Horse, and was born at Goonah, Central India, July 27, 1871. Educated at Wellington College and Sandhurst, he obtained a commission in the Royal Warwickshire Regt. in February 1895. He served with his regiment for two years in Ceylon, afterwards transferring to the Army Service Corps. He saw active service during the rebellion in Sierra Leone in

1898-9, for which he received the medal and clasp. During the South African War he served chiefly with Lord Methuen's column from October 1899 to 1902, when he was invalided home. For his services he received the Queen's and King's medals. In 1908 he retired, but was recalled to the Army Service Corps on the outbreak of the present war; he was employed in England till August 1915, when he went to France with the rank of Temporary Lieut.-Colonel. He was present at the battle of Loos and was mentioned in dispatches.

Horsbrugh's interest in natural history, particularly in birds, dated from his childhood and continued throughout his life. He made observations on the bird-life of the various countries in which he was stationed and in which he travelled. He had a considerable collection of bird-skins, but was perhaps best known for his skill in breeding and handling live birds, and he had a fine collection of Ducks of various species in his grounds at Tandridge. His best-known work is one on the 'Game-birds and Waterfowl of South Africa,' published in 1912 (see '*Ibis*,' 1912, p. 670), a most valuable volume mainly designed to meet the requirements of the sportsman in South Africa, but also most useful to the more serious naturalist.

In the preparation of this work he was greatly aided by Sergt. (now Lieut.) C. G. Davies of the Cape Mounted Rifles, not only in the illustrations, which were from his brush, but also for many of the field-notes, though Horsbrugh himself had spent seven years in South Africa and had made very good use of his opportunities for observation.

Horsbrugh's other writings are chiefly to be found in the '*Avicultural Magazine*,' to which he was a frequent contributor. He was elected a Member of the Union in 1904.

In April 1902 Horsbrugh married Elizabeth Kearsley, daughter of Chapman Mitchell, of Philadelphia, U.S.A., and niece of the well-known writer and physician Dr. Weir Mitchell, of the same place.

FREDERIC WILLIAM PROCTOR.

The death on June 13 last of Major Proctor, who was so well known to many of us at the British Ornithologists' Club, will be much regretted by his many friends. Some months previously he had been very ill and it was found necessary to amputate one of his legs, and even this did not save him.

Major Proctor, who was born in 1862, was the son of William Proctor of Torquay. Entering the army, he served for many years in the 33rd (Duke of Wellington's) Regiment, and was afterwards attached to the 3rd Batt. Royal Welsh Fusiliers. He eventually retired with the honorary rank of Major.

When the present war broke out, he again offered his services and was appointed Recruiting Officer at Longton, Staffs, and afterwards transferred to the Signalling Depot of the Royal Engineers at Fenny Compton, Bucks. Here he worked until October 1915, when the illness from which he subsequently died began to show itself.

Always deeply interested in birds and their eggs, he began to form a collection of eggs while stationed in India in his early days. He subsequently visited Madeira, Spain, Hungary, and Swedish Lapland in search of rare species. A second visit to southern Spain in company with Mr. S. L. Whymper resulted in the acquisition of many eggs of the large Birds of Prey from the mountains, as well as those of many other birds from the Guadalquivir Valley.

Major Proctor was elected a Member of the Union in 1893, and was also a constant attendant at the meetings of the Club, where from time to time he exhibited interesting specimens of eggs he had collected; but he was not a writer, and published little, being content to make his observations and to build up his collection.

Major Proctor leaves a widow and four children, three of them sons, of whom one is serving in the Army and one in the Navy.

JOHN MACFARLAN CHARLTON.

Capt. J. M. Charlton, who was killed in action near La Boisselle on July 1 at the age of twenty-five, was an enthusiastic naturalist and taxidermist. He was at Uppingham School from 1907 to 1910, where he was one of the official observers of the ornithological section of the Natural Science Section.

He contributed a good many observations, chiefly connected with bird-life in Northumberland, to 'British Birds' and the 'Zoologist,' and published in the latter journal a more extended account of the Birds of South-east Northumberland.

ROLAND TRIMEN.

Though he can hardly be considered an ornithologist, Mr. Roland Trimen, F.R.S., whose death we regret to hear took place at Epsom on July 25 last, was a distinguished entomologist. Born in 1840, he entered the Cape Civil Service in 1860, and was appointed Curator of the South African Museum at Cape Town in 1873. During his tenure of that post his chief interest was in the collections of South African insects and especially butterflies, on which he published two important works. During this period he described and figured in the 'Proceedings of the Zoological Society' two remarkable birds, *Coracias spatulatus* (the Racket-tailed Roller) and *Laniarius atrocroceus*; the latter is now generally acknowledged to be only an aberration of *L. atrococcineus*, the handsome Red and Black Shrike found in Bechuanaland.

Trimen retired from his post in South Africa in 1895, and was succeeded by Mr. William L. Selater. In 1910 he was awarded the Darwin Medal of the Royal Society, of which he was elected a Fellow in 1883, for his work on mimicry and allied problems in African Lepidoptera. He was also at one time President of the Entomological Society of London.

EDWARD ARTHUR BUTLER.

Lieut.-Colonel Edward Arthur Butler, a Member of the British Ornithologists' Union since 1884, died at his residence, Winsford Hall, Stokesby, near Great Yarmouth, on April 16.

Throughout his life—he was in his seventy-third year—he found in ornithology an abiding interest and pleasure.

Born at Coton House, Warwickshire, he was the third son of the late Honble. Charles Lennox Butler, and a grandson of the 13th Lord Dunboyne. Educated at Eton, he entered the Army in 1864 as Ensign in the 83rd Regiment, afterwards the 1st Battalion Royal Irish Rifles, and retired with the rank of Lieut.-Colonel in 1884. Three years at Gibraltar, where he enjoyed the friendship of Howard Irby, gave him his first opportunity of collecting abroad, and were followed by eleven years of service in India, during which he became one of the keenest of the band of ornithologists of which Allan Hume was the head. He contributed to 'Stray Feathers' an account of a visit to the island of Astola in the Persian Gulf, the great breeding-place of *Sterna bergii*, and a series of articles on the Avifauna of Mount Aboo and Northern Guzerat, while his egg-collecting experiences were described in many notes in Hume's 'Nests and Eggs of Indian Birds.' In 1880 he published in the Bombay Gazeteer a "Catalogue of the Birds of the Southern Portion of the Bombay Presidency."

The outbreak of the first Boer War took him to South Africa, where he met with two congenial spirits in Major H. W. Feilden and Capt. S. G. Reid. The three of them devoted as much time as they could to the study of the local avifauna, and collaborated in publishing their notes in the 'Zoologist,' and in contributing to 'The Ibis' an article on the "Variations of Plumage in *Saxicola monticola*" (1883, p. 331). After the conclusion of peace his regiment was brought home, and Butler was stationed for

a time in Alderney and subsequently in Belfast until his retirement, when he settled down in the eastern counties for the remainder of his life.

Butler was an extremely good field-ornithologist, with a wonderful "eye for a bird," instantly recognizing any species he had previously met with at the merest glimpse of it, and at almost any distance. He was a very keen sportsman, an untiring walker, and a capital shot. The many beautifully prepared bird-skins which he collected in his time remain in the Natural History Museum. A remarkably little-known owl, *Asio butleri* Hume, perpetuates his name in ornithology, but the Pipit, *Anthus butleri*, which Dr. Sharpe named after him, has since proved to be only the fully-plumaged male of *Anthus chloris*.

He married in 1872 Clara, second daughter of the late General J. T. Francis, Bombay Staff Corps. Her death in 1912 was a great blow to him, and after it he became somewhat of a recluse, busying himself with his garden and his collections, and going about very little. He leaves three sons—Arthur Lennox, until lately Superintendent of Game Preservation in the Sudan, who has inherited his father's interest in ornithology and has been a Member of the Union since 1899, Charles Edward, and Harry Francis.—A. L. B.

XXXIII.—Notices of recent Ornithological Publications.

Bangs on the Bahaman Mocking-bird.

[The smaller Mocking-bird of the Northern Bahamas. By Outram Bangs. Proc. New England Zoölogical Club, vi. 1916, p. 23.]

This bird, formerly considered identical with the widely-spread Mocking-bird of the United States, is here described as a new subspecies under the name *Mimus polyglottos delenificus*. It is found only on the northern island of the Bahama group, its place on the southern islands being taken by *M. p. elegans* Sharpe.

Berg on the birds of Tåkern Lake.

[Tåkern, en bok om fåglarnas sjö af Bengt Berg. Pp. 1-475; many photographs. Stockholm (Norstedt), 1913. 8vo.]

Tåkern Lake lies in the centre of southern Sweden, about halfway between Stockholm and Gothenburg in the province of Östergötland, and appears to be the favourite resort of marsh- and water-birds.

Here Mr. Berg must have spent a great deal of time taking photographs not only of the birds, but also of the scenery and vegetation, and these are all reproduced in the present work and form a most beautiful series of pictures. Almost half the plates and letterpress are taken up with the Swan, presumably *Cygnus olor*, which apparently breeds abundantly on Lake Tåkern. Other birds of which photographs are given are the Sedge- and Reed-Warblers, Marsh-Harrier, Lapwing, Curlew, Kentish Plover, Snipe, Coot, Mallard, Pochard, Black-headed Gull, Tern, and Great Crested Grebe.

The photographs are all reproduced with great skill, and the whole forms a wonderful series of illustrations of the bird-life of Sweden.

Buturlin on the Nuthatches.

[A short Review of the Nuthatches (Fam. Sittidæ). By S. A. Buturlin. Trans. Soc. Imp. Nat. Pétrograd, xliv. 1916, pp. 145-173.]

This important paper by Prof. Buturlin is unfortunately published in Russian, but it contains a very full summary in English, so that the more important conclusions can be easily understood. Prof. Buturlin proposes to divide the Nuthatches among twelve different genera and subgenera; of these seven are now introduced for the first time. They are as follows:—*Pæcilositta* for *Sitta azurea* Less., *Cyanositta* for *Dendrophila corallipes* Sharpe, *Arctositta* for *Sitta arctica* But., *Homositta* for *S. castaneoventris* Frankl., *Micrositta* for *S. villosa* Verr., *Leptositta* for *S. leucopsis* Gould, and *Mesositta* for *S. himalayensis* Jard. et Selby.

A key of the structural and other characters by which

the genera are distinguished is given in the English summary.

There are also three new subspecies described :—*S. europæa sakhalinensis*, *S. e. hondoensis*, and *Rupisitta tephronota iranica*, the names of which indicate clearly the localities whence they are derived.

Cherrie on new South American Birds.

[Two new Birds from Venezuela. New Birds from the Collection of the Collins-Day Expedition to South America. By George K. Cherrie. Bull. Amer. Mus. N. H., New York, xxxv. 1916, pp. 389-397.]

In the first article are described two new forms of the genera *Hemithraupis* and *Argicus*, obtained by Mr. Klages in Venezuela. In the second article *Taraba major virgultorum*, *Xiphorhynchus guttata rimarum*, *Capito auratus insperatus*, *Piaya rutila chaparensis*, *Hypocnemis collinsi*, *Drymophila phantalis*, all from Bolivia; *Capito dayi*, *Coccomorphus flavus inornata*, *Formicivora rufa chapmani*, from Brazil; and *Piaya rutila orinocensis* from Venezuela, are described as new.

Ghigi on the Crested Guinea-fowls and on a new Pheasant.

[Sulle forme orientali del genere *Guttera* Wagler. Alessandro Ghigi. Riv. Ital. Ornit. iii. 1915, pp. 156-170, tav. iii.]

Hierophasis dissimilis, nuova forma da mutazione di *H. swinhoii* Gould. Id. ibid. pp. 171-181, tav. iv.]

Some years ago Prof. Ghigi of Bologna described two new forms of the genus *Guttera*. One of these, based on a living example obtained from M. Rambaud of Marseilles, he named *G. barbata*; the second was based on the Crested Guinea-fowl of the Zambesi region, which he separated from that inhabiting Zululand and Natal.

Prof. Ghigi has recently had an opportunity of examining further examples of these two forms living in the Zoological Gardens of Berlin and Hamburg, and he now takes this opportunity of offering a *résumé* of the various forms of the genus inhabiting eastern Africa, with additional descriptions and a key. Altogether, eleven forms are included in the key.

The curious structure of the clavicles, unique among birds, is figured on the plate. The symphysis of the two bones is enlarged and hollowed into a pouch-like structure, compared by the author to the labellum of an orchid. Into this pouch a loop of the greatly elongated trachea is fitted.

The second paper deals with an interesting variation or mutation of Swinhoe's Pheasant, which arose suddenly among some living examples of this bird kept by Prof. Ghigi in 1908, and which have continued to breed in his pheasantries. This race has been named by him *H. dissimilis*.

Hersey on the birds of Alaska.

[A list of the Birds observed in Alaska and north-eastern Siberia during the summer of 1914. By F. Seymour Hersey. Smithsonian Misc. Coll. Washington, vol. lxvi. no. 2, pp. 1-33, 1916.]

In the summer of 1914 the author was commissioned by Mr. A. C. Bent to visit Alaska to obtain data, and especially photographs of nesting-birds, for his forthcoming work on the "Life-Histories of North-American Birds."

Leaving Seattle on May 12 he visited Unalaska and Nome, and spent a month at the mouth of the Yukon river. He then made an excursion to Point Barrow and back, where he met and rescued Mr. W. S. Brooks, whose journey has already been noticed in our last number (p. 502). A list of the birds noted and collected is given with localities and indications of their breeding-times, but the details of the observations and the photographs are reserved for Mr. Bent's forthcoming work. As would be expected, most of the birds met with are sea- and shore-birds. Among the rarer and more interesting forms are *Sterna aleutica*, *Polysticta stelleri*, *Somateria spectabilis*, *Arquatella maritima ptilocnemis*, the Humming-bird *Selasporus rufus*, and the Swallow *Hirundo erythrogastra*.

Mathews on the Birds of Australia.

[The Birds of Australia. By Gregory M. Mathews. Vol. v. pt. 3, pp. 249-352, pls. 255-266. London (Witherby), May 1916. 4to.]

This part is comparatively easy to review, as it only contains three Hawks, three Owls, and the Osprey, all well

known to Australian ornithologists. The Watling drawings here come under consideration again, with the works of Latham, Gmelin and the latter's translator, Kerr; while the life-histories of the birds are even more full and interesting than usual.

We may pass over the Osprey with its one "ill-defined" subspecies, which Mr. Mathews terms *cristatus* (Vicill.), the variable *Cerchneis cenchroides*, of which no subspecies is now admitted, and also *Falco subniger* which he puts under his *Notofalco*, where a supposed Queensland subspecies is suppressed. This takes us to the distinctly Australasian type *Hieracidea*, placed next to *Cerchneis*; the author being very emphatic as to the separation of both from *Falco*. Of this Hawk innumerable variations seem to occur; and, as they overlap in places, we should ourselves have refrained from accepting, or giving, Latin appellations to each, while considering them somewhat erratic manifestations of an extremely variable species, or phases not yet sufficiently fixed to warrant nomenclatural distinction.

It is quite otherwise, however, with *Spiloglaux novæ-zealandiæ*, which may be next considered. Here the races appear well-defined and capable of being geographically separated, while some have been formerly distinguished as species by Gould and other writers. We quite agree with Mr. Mathews that the vast extent of Australia must always be kept in mind; and it will be noticed that in this case the New Zealand bird is considered identical as a species with the Australian, which therefore covers a still wider area.

The subspecies of *Hieracidea berigora* admitted are *orientalis*, *berigora*, *occidentalis*, *melvillensis*, *kempi*, *centralis*, and *tasmanica*: the last three being new. Those of *Spiloglaux* are *novæ-zealandiæ*, *venatica*, *boobook*, *clelandi*, *leachi*, *marmorata*, *albaria*, *royana*, *mixta*, *lurida*, *macgillivrayi*, *everardi* subsp. n., *ocellata*, and *melvillensis*.

Hieracoglaux connivens may similarly be subdivided into *peninsularis*, *occidentalis*, *suboccidentalis*, *addenda*, and *connivens*, with *assimilis* and *rufostriata* from the islands north or east of Australia.

Mr. Mathews creates a new genus *Berneyornis* for *H. strenua*, and accepts *Rhabdoglaux*, *Strix*, and *Megastrix* for the remaining Owls of the country; the two latter, however, are not in this part.

Figures are given of two forms in the case of the Kestrel and four in that of the Boobook Owl, which should be found most useful to subsequent workers.

Mullens and Swann on the Bibliography of British Birds.

[A Bibliography of British Ornithology from the earliest Times to the End of 1912, including Biographical Accounts of the principal Writers and Bibliographies of their published Works. By W. H. Mullens, M.A., etc., etc., and H. Kirke Swann. Parts i. & ii. pp. 1-240. London (Macmillan), 1916. 8vo. Price, when complete, 36s.]

Mr. Mullens has long been known to us as possessing an unrivalled knowledge of the older authors who have written on British Birds, and is, we believe, the fortunate possessor of a most valuable collection of the older works on the subject. He has now, in collaboration with Mr. Kirke Swann, given us the first instalment of a volume which promises to be a most valuable and instructive one.

So far as we know, the only previous attempt to collect the titles of works relating to British Birds was that of the late Dr. Elliott Coues, who, in the fourth instalment of his Ornithological Bibliography, published in the 'Proceedings of the United States National Museum' in 1879, issued his "Faunal Publications relating to British Birds" (see 'Ibis,' 1881, p. 158). This, however, was admittedly imperfect, and was only intended to serve as a foundation for a larger and more complete work. This, Messrs. Mullens and Kirke Swann, judging by the first part now issued, are now giving us.

It would perhaps have been better to have excluded biographies of living authors from the bibliographical portion. As it is proposed to prepare complete county indices, the papers and works of these living authors might have been included here. There are also a number of authors and works the inclusion of which would be difficult

to justify on the grounds that they added much to our knowledge of British Birds ; but, on the whole, the work, so far as it has gone, is extremely interesting, especially the notices of the older authors—such, for instance, as Richard Carew of East Antonie who flourished in the reign of Queen Elizabeth, and wrote on the birds of Cornwall in his survey of that county. Perhaps the earliest writer mentioned is Dame Berners, who is said to have been Prioress of Sopwell Nunnery in Hertfordshire, and is supposed to have written the “Boke of St. Albans,” containing treatises on hawking, first printed at St. Albans in 1486.

Whether intentionally or not, we find no mention of the following modern authors, who appear to have contributed articles to various periodicals of over a page in length :—E. N. Bloomfield, M. Barr, W. Berry, S. E. Brock, J. J. Beeston, and, finally, the Duchess of Bedford, who, one would have thought, well deserved a mention.

We shall look forward to the completion of this work with the greatest pleasure, and shall hope to give it when finished a more extended notice.

Ridgway on American Birds.

[The Birds of North and Middle America : a descriptive catalogue. By Robert Ridgway, Curator, Division of Birds. Part VII. Families Cuculidæ, Psittacidæ, and Columbidae. Pp. xii+543 ; 24 pls. Bulletin of the United States National Museum, no. 50. Washington (Government Printing Office), 1916. 8vo.]

All workers in American ornithology appreciate the great work which Mr. Ridgway has undertaken and which appears volume by volume at intervals of a year or two. The first of these, which was published in 1901, contained an account of the Finches ; the eighth, now in the course of preparation, will contain the Shore-birds, Gulls, and Hawks. Perhaps a ninth will complete the work. Descriptions of all the birds inhabiting the North American continent are given, as well as those of the West Indies and Galapagos. A good number of extralimital species are also included in the keys in order to elucidate the relationships of the North American forms treated of.

The present volume contains the descriptions of 28 Cuckoos, 78 Parrots, and 91 Pigeons, the greater number of which belong to the neotropical section of the avifauna treated of. The United States can hardly claim more than three Cuckoos, one Parrot, and three or four Pigeons, and of these one of the Pigeons is extinct and the Parrot probably so.

Mr. Ridgway recognizes two forms of the Carolina Paroquet: *Conuropsis carolinensis carolinensis*, which formerly inhabited the coastal plain of the United States from Florida to Virginia, occasionally ranging even to New York State, and *C. c. ludovicianus*, formerly inhabiting the Mississippi valley from the Gulf Coast to the southern shores of the great lakes. Of the former Mr. Ridgway writes that it is "so nearly extinct that only a few colonies may yet exist in remote parts of southern Florida"; and of the latter that "if still existing, to be found only in small numbers in south-western Arkansas or north-western Louisiana." The last dated record given for the former is 1901, for the latter 1891.

We fear that the Carolina Paroquet will shortly share the fate of the Passenger Pigeon and the Labrador Duck.

Mr. Ridgway has somewhat modified the general scheme of classification as proposed in the first part of this work, where the "Order Culiciformes included the Parrots as well as the Cuckoo-like birds (Cuculidæ and Musophagidæ), this being in accordance with the views of Gadow and Garrod. The Parrots are, however, so distinct and sharply circumscribed as a group that it seems better to consider them as a separate order." In the same way the Columbiformes, which in the earlier scheme were merged with the Charadriiformes, are here separated into two distinct orders. These changes certainly seem justified in accordance with the views of modern ornithologists.

On the series of twenty-four plates there are outline-drawings of wings, tails, beaks, and feet to illustrate the structural characters, and these will be found most useful aids in the identification of the various genera.

Salvadori and Festa on Tripolitane Birds.

[Alcuni uccelli della Cirenaica, colla descrizione di una nuova specie del genere *Caccabis*. Nota di T. Salvadori ed E. Festa. Boll. Mus. Zool. Anat. Comp. Torino, xxxi. 1916, no. 714, pp. 1-2.]

This note contains the names of some twelve species collected by an Italian officer in Cyrenaica and presented to the Turin Museum. The only noteworthy form is a new species or rather subspecies of Red-legged Partridge allied to *Caccabis spatzi* of Tunis and Algeria, but differing in its darker and more bluish throat and chin. Messrs. Salvadori and Festa distinguish this form under the name of *C. callolema*. Four examples of this new Partridge were obtained to the south of Bengasi.

Stresemann on the Eastern Black Crows.

[Über die Formen der Gruppe *Corvus coronoides* Vig. & Horsf. Von Erwin Stresemann. Verhandl. Ornith. Ges. Bayern, xii. 1916, pp. 377-404.]

Through a neutral country we have received a copy of Mr. Stresemann's paper on the subspecific forms of the Australian Crow, *Corvus coronoides*.

The investigations on which the work is based were all made in England in 1913-14 on material contained in the British and Tring Museums, and in Mr. G. M. Mathews' collection; to all of whom due acknowledgment is made.

The first portion of the paper contains a review of the various forms of *Corvus coronoides* which, as a species, is spread over the whole of eastern and southern Asia and Australia. Twenty subspecific forms are recognized and three of these are described for the first time—*C. c. connectens*, Loochoo Isls., *C. c. madaraszi*, Ceylon, and *C. c. hainanus*, Hainan.

In the second half of the paper, Mr. Stresemann endeavours to trace the evolution of these various forms from what he regards as the primitive stock of the species, namely *C. c. hassi*, the form found in northern China, whence he believes it spread northwards to Manchuria and Japan, south-westwards to India and Ceylon, and south-eastwards

to Australia. The most important characters used for distinguishing the various races are the colour of the iris, the colour of the bases of the feathers, and the size. These and the effects of climate and temperature are all discussed, and the general conclusion is reached that those forms inhabiting plateaus and mountain-ranges are, as a rule, larger than those inhabiting less elevated and warmer regions.

Swarth on the Bewick Wren.

[The Pacific Coast Races of the Bewick Wren. By Harry A. Swarth. Proc. Cal. Acad. Sci. (4) vi. 1916, pp. 53-85, pl. 2.]

Bewick's Wren is an abundant species throughout the warmer parts of the United States and Mexico. East of the Rocky Mountains, as is so often the case, there is very little subspecific variation. In the west, however, especially on the Pacific Coast, owing doubtless to the great variation in humidity, a number of subspecific forms can be distinguished, varying from the dark short-tailed *calophonus* of British Columbia and Washington to the pale long-tailed *charienturus* of southern California.

Mr. Swarth has had over 500 examples of Bewick's Wren under examination, and distinguishes five mainland and three island races, whose ranges are shown in a distribution-map and inter-relationships exhibited in a diagnostic table.

The whole paper is a very good example of the thorough methods of the modern American school, and is distinguished by its clarity of thought and expression.

Thorburn's 'British Birds.'

[British Birds, written and illustrated by H. Thorburn, F.Z.S. In four volumes. Vol. iii. pp. vi+87, pls. 41-60. London (Longmans), 1916. 4to.]

The third volume of Thorburn's 'British Birds' contains the account of the Herons, Ducks, Doves, Game-birds, and Rails, and it is a great pleasure to turn over the beautiful plates he has prepared for it. The Game-birds and Ducks

have always been favourite subjects with Mr. Thorburn, and he has succeeded admirably with them; we would specially commend his pictures of the Capercaillie and the Pheasants, both of which are depicted with a snowy background. In the case of the Pheasants the Mongolian, Chinese Ring-necked, and Japanese are represented, as well as the old original English race, which is supposed to have been brought from Colchis on the Black Sea. To our mind the Ducks are too crowded to show off well, but this perhaps is inevitable if only a limited number of plates can be devoted to a large number of species.

Witherby on Moults.

[The Moults of the British Passeres, with Notes on the Sequence of their Plumages. By H. F. Witherby. *British Birds*, ix. 1915 & 1916, pp. 148-151, 167-176, 239-248, 314-316.]

A few years back Mr. Witherby and Dr. Ticehurst wrote on this subject, and now Mr. Witherby alone is continuing these investigations and proposes to review the moult and sequence of plumage in systematic order throughout the British Passeres. It seems a pity that he has not undertaken to do this in birds generally, but perhaps that is a task which is so vast and requires such an enormous series of specimens that it is at present impossible. The four parts here noticed deal with the Corvidæ, Sturnidæ, Oriolidæ, Fringillidæ, and Alaudidæ. In all these families the principal moult is the autumn one, and in the first three the effects of abrasion on the plumage are not very noticeable. Among the Finches we find some species which have a partial spring moult—in the Snow-Finch confined to the throat, and in some of the Buntings affecting certain parts of the head, throat, and breast. In this family, too, abrasion of the tips of the body-feathers often greatly alters the appearance of the birds, especially in late summer.

The Larks are remarkable in the fact that the young birds have a complete moult, including the wing- and tail-feathers, during the first autumn, and with this we find

among the Larks, as well as among some of the birds in which the first autumnal moult is complete, an interesting point. This is, that in the juvenile plumage the outer (bastard) primary of the wing is much larger and generally broader and less pointed than in the first winter and subsequent plumages.

We hope Mr. Witherby will be able to continue and complete these most interesting papers on the moult of British Birds.

British Birds.

[British Birds: An illustrated Magazine devoted to the Birds on the British List. Vol. ix. June 1915 to May 1916.]

Our contemporary 'British Birds,' under the editorship of Mr. H. F. Witherby, continues to maintain its interest, and the recently completed volume contains much that will be gladly read by all ornithologists. Miss Maud Haviland has four articles on her experiences with the Grey Phalarope, the Asiatic Golden Plover, the Grey Plover, and the Lapland Bunting in the Yenesei Valley, where she recently spent a summer season. These are illustrated with photographs taken by herself.

Miss E. L. Turner, another of our more successful lady photographers, sends a series of articles on what she terms the "wait and see principle" of bird-photography. This consists of setting up tent or blind in some spot likely to be frequented by birds, and waiting with a camera inside to see what may turn up. By this method she has obtained some very characteristic photographs of various shy birds, many of which members of the British Ornithologists' Club will remember were exhibited on the screen at a recent meeting.

Mr. Eric B. Dunlop discusses what he terms the ovitegous habit of birds, by which we presume he means the habit which some birds have of commencing to incubate before the full clutch of eggs is laid. This he finds by observation to be a characteristic of the American Crow, the Ringbill Gull, and Caspian Tern. He believes that it conduces to

the greater safety of the eggs, and that in many other cases where an open nest is used the female, before leaving the nest, covers the eggs.

Another article of considerable interest is that of Miss Annie Jackson on the moults of the British Ducks. She again insists on the impossibility of "repigmentation" of feathers and that all changes of colour are due to either moult or wear. She also finds that the female surface-feeding Ducks have a complete body-moult in spring and that the underlying down is also shed and a new special down acquired. In the male birds the spring moult is most unusual. These facts, if not altogether new, are but little known, and Miss Jackson's account of the moult is a valuable contribution to our knowledge of the subject.

As many as six new forms are added to the British list in the present volume. These are *Luscinola melanopogon*, *Hypolais pallida*, *Enanthe leucura syenitica*, *Puffinus assimilis boydi*, *Puffinus kuhlii borealis*, and *Tringa incana*. All have been taken at or near Hastings in Sussex, whence come an unfailing supply of novelties, due to the energetic researches of Messrs. Ford-Lindsay, Parkin, and Nichols.

Mr. Witherby's papers on the moult of British Passeres and on the 'British Birds' marking-scheme have already been noticed in our pages, but an interesting note of his in the April number informs us of a third example of a Swallow marked in England being taken in South Africa. In this case the bird was ringed at Lytham in Lancashire on July 3, 1915, and was picked up dead near Grahamstown in the Cape Province on February 6, 1916, by Mr. S. G. Amm.

The Emu.

[The Emu. Official Organ of the Royal Australasian Ornithologists' Union. Vol. xv. July 1915 to April 1916.]

The last completed volume of 'The Emu' contains a great deal of interesting matter, and in the present short notice we can only mention a few of the more important articles. Dr. R. W. Shufeldt leads off the first number with an account of the osteology of the Stone-Plover, *Orthorhamphus*

magnirostris, which is described at length and illustrated by seven photographic plates taken by himself. Dr. Shufeldt considers that there is little or no ground for the alleged close relationship of the Stone-Plovers and the Bustards, but that the Stone-Plovers bridge the gap between the Plovers and the Gulls. A second article deals with the osteology of Harris's Flightless Cormorant (*Nannopterum harrisi*), of the Galapagos Is. Dr. Shufeldt asserts that the claim of this Cormorant to generic distinction rests solely on the modifications of the skeleton due to the loss of flight. A third article deals with the eggs of birds as compared with those of reptiles and is of a general nature.

There are a number of excellent field-notes, generally illustrated with photographs of the nests and eggs, of various Australian birds; among them are those of Mr. A. W. Swindells on the nesting-places of *Phalacrocorax gouldi* on the steep and inaccessible cliffs of the Tasmanian coast, of Miss Fletcher on the nesting of the Black Cormorant (*P. carbo*) along a Tasmanian river, of Mr. A. H. Chisholm on the Yellow-fronted Shrike-Tit (*Falcunculus frontatus*) in Victoria, and of Mr. S. A. Hanscombe on the Night-Heron (*Nycticorax caledonicus*) in New South Wales.

Mr. H. L. White has rediscovered the rare form of the Rosella Parrot (*Platycercus splendidus*) on the borders of New South Wales and Queensland, and gives some account of its distribution and that of its better-known congener, *P. eximius*. The first-named seems to have been lost sight of since Gould described it in 1845.

The only new forms we find described in the present volume are two new Petrels, or perhaps more correctly Shearwaters, recently discovered on the coast of New South Wales by Mr. A. F. Basset Hull. These are *Cinathisma cyanoleuca*, gen. et sp. n., and *Neonectris tenuirostris gratianus*, subsp. n. We venture to doubt whether the first-named form is sufficiently distinct to warrant the introduction of a new generic name as distinct from *Puffinus*, but about this it is difficult to make a positive assertion unless one has an opportunity of examining the original specimen.

A new or comparatively new feature of 'The Emu' is the introduction of coloured plates. Two of these are given in the present volume, illustrating *Macgillivrayornis claudi*, a new Honey-eater from the Cape York Peninsula, recently described by Mr. Mathews, and *Pœcilodryas albigularis*, a Shrike-Robin, described some years ago by Lord Rothschild and Dr. Hartert, also from Cape York.

Under the auspices of the R. A. O. U., Mr. Wilson announces that it is proposed to start a "bird-ringing" scheme for Australia. Up to now very little work appears to have been accomplished in this direction among Australian ornithologists, and we wish the scheme every success and hope that it will throw some much needed light on the problems involved.

Another scheme in contemplation is the preparation of a new official check-list of Australian birds by a Committee of the R. A. O. U. The first edition (see 'Ibis,' 1913, p. 699) was unfortunately based on ideas, so far as nomenclature is concerned, which are hardly consonant with the generally accepted principles, not only those of the International Code, but also those of the earlier zoologists who accepted the Stricklandian Code. The new edition is as we understand to be based on the 'List of British Birds' recently published by the B. O. U., and we naturally feel that no better model could be selected. We shall look forward eagerly to see the completion of this work.

The International Commission on Nomenclature.

[Opinions rendered by the International Commission on Zoological Nomenclature. Opinion 67, pp. 177-182. Smithsonian Institution, Washington, Publ. no. 2409, April 1916.]

Some time ago (see 'Ibis,' 1914, p. 171) the International Commission on Zoological Literature prepared a list of 189 generic names of birds, which they hoped might be accepted as fixed by the majority of working ornithologists. Copies of this list were circulated among about 350 zoologists and zoological institutions for criticism and opinion. Out of the 189 generic names submitted, objections were raised

against 87. To the remaining 102 no objection of any kind has been offered. These generic names are now reprinted in the present publication, and we may hope that, so far as these names are concerned, no further alteration will be necessary.

Such names as *Charadrius* and *Colymbus*, about which controversy has arisen, do not appear in the present list, but are reserved for the further opinion of the special Advisory Committee on the Nomenclature of Birds.

If this Committee are able to impress their opinion in regard to the controverted names on ornithologists generally so that they can be universally accepted, a great stride forward in the matter of a fixed nomenclature will be established.

Messenger Ornithologique.

[*Messenger Ornithologique*. Sixième Année, 1915. Moscow.]

The volume of the Russian Ornithological Journal for 1915 contains a number of articles of undoubted interest, but unfortunately, except in a very few cases, they are written in Russian, and it is impossible to give here more than a summary of the titles.

Of faunal papers the editor, G. I. Poljakov, writes on the birds of Ussuri-land in the extreme eastern part of Russian Asia. Two new subspecies are described, *Perdix daurica sushkini* and *Bubo bubo ussuriensis*. N. A. Sarudny continues his account of the Avifauna of Turkestan; A. I. Tugarinov contributes an article on the birds of the Minusinsk district on the borders of the Altai Region; E. S. Ptouchenko writes on the Avifauna of the Kouban Province in south-east Russia; P. & J. Zalesski on that of the Tomsk district; and B. M. Shitkow and S. G. Schtecher on that of the Commander Islands of the Pacific. This last is illustrated with photographs of nests and nesting-sites.

Prof. Sushkin, whose papers have an English summary appended, gives an account of a trip he made in 1914 with

his wife and two students to the Russian Altai and north-western Mongolia. Twelve hundred bird-skins were brought back; a list of these is given along with a review of the local zoological regions.

Other new species and subspecies described are as follows:—

Sitta europæa sztolemani Domaniewski, p. 142;

Jynx torquilla harterti and *Bombycilla garrulus centralusiæ*

Poljakow, pp. 135, 137, from the Altai;

Bubo bubo zaissanensis Hachlow, p. 224;

Sterna hirundo turkestanensis Sarudny, p. 226;

Carduelis carduelis colchicus Kondashew, p. 313;

Muscicapa atricapilla sibirica Chachlow, p. 315.

Other papers are by J. Domaniewski on *Cyanistes cyanus* and its relations to *C. pleskei*; by K. Gréve on feral birds in the Zoological Gardens at Riga; by N. A. Sarudny on the status of *Pica pica bactriana*; and by P. Sushkin on the status of *Falco lorenzi* Menzb., which he regards as identical with *F. altaicus* of the same author, *lorenzi* being the adult and *altaicus* a dark individual in its second plumage; but the oldest name is *F. altaicus*.

A number of papers by Prof. Buturlin in the present volume have already been noticed ('Ibis,' 1915, p. 786).

Revue Française d'Ornithologie.

[Revue Française d'Ornithologie, Scientifique et Pratique. 7^e Année, nos. 69-80. Jan.-Dec., 1915.]

We have recently received from M. Menegaux, the courteous Editor of the French Ornithological Journal, the numbers for last year, and we will endeavour briefly to give a list of the more important contents.

The first article in the January number is one by Dr. Millet-Horsin on the Birds-of-Prey met with by him at Dakar in French West Africa. The same author also writes an interesting account of a native myth in regard to the Hornbill, *Ceratogymna elata*, and a further contribution

on the birds of Lemnos as observed by him when taking part with his regiment in the Gallipoli Expedition last year. Other faunal lists are by M. A. Engl on birds collected by him during two journeys to British India; MM. II. and A. Vaucher on the birds of Morocco, from Tangier to Mogador; M. J. Loranchet on the birds of Kerguelen, where observations were made on twenty out of the twenty-one birds recorded breeding there; and by M. P. Bédé on the birds of Sfax in Tunisia.

Faunal papers relating to France include one by M. Corsimault on the singing birds of Vendôme, with musical scores of their songs; by M. J. l'Hermitte on the birds of Provence; and by the Comte de Tristan on birds observed at the Belgian front in the Nieuport Dunes. It appears that the war and the noise of the guns have had but little effect on bird-life.

M. Menegaux has recently received from Meraké, in southern New Guinea, a curious Bird-of-Paradise which combines the characters of *Paradisea raggiana* and *P. noveguineæ* in about equal proportions, and which he believes must be a natural hybrid. There are somewhat similar examples from the same neighbourhood in the Tring Museum.

The "crôle" of the Snipe is discussed by M. de la Fuye. This is a chasing and circling flight of both sexes, which takes place at dusk during the spring months and is probably connected with courtship. It appears to correspond to what is known in England as the "drumming" of Snipe, though the curious sounds made are not mentioned. Another more extensive paper by the same author deals at length with the Common, Double, and Jack Snipes and their migrations, the lines of which are plotted on a map of Europe.

In a short note M. Chapal confirms some previous records of the fact that the Rock-Martin (*Riparia rupestris*) winters in some of the sheltered ravines of the mountains of the Dépt. Gard in the south of France; and, finally, M. L. Ternier writes at length on the economics of the Starling, a bird protected by law in France, and finds that it does an

immense amount of damage especially among the cherry-orchards in the summer. He concludes that steps should be taken in certain districts at any rate to reduce their numbers. Fruit-growers in other parts of the world, even in South Africa, where the Starling has been introduced and has spread very quickly, have had the same experience.

List of other Ornithological Publications received.

- CHERRIE, G. K. Some apparently undescribed Birds from the Collection of the Roosevelt South American Expedition. *Bull. Am. Mus. N. H.* xxxv. art. 17, 1916.
- GURNEY, J. H. Ornithological Report for Norfolk (1915). *Zoologist*, 1916.
- SHUFELDT, R. W. Some Cardinal and Owl Notes. ("Guide to Nature," ix. Sound Beach, Conn., 1916.)
- WHITE, S. A. In the Far North-West. (Adelaide, 1916.)
- The Auk. (Vol. xxxiii. Nos. 1-3. Cambridge, Mass., 1916.)
- Avicultural Magazine. (Third Series, Vol. vii. Nos. 9-11. London, 1916.)
- Bird Notes. (New Series, Vol. vii. Nos. 7-9. Ashbourne, 1916.)
- British Birds. (Vol. x. Nos. 2-4. London, 1916.)
- Canada, Geol. Survey. Summary Report for 1915. (Ottawa, 1916.)
- The Condor. (Vol. xviii. Nos. 3, 4. Hollywood, Cal., 1916.)
- The Irish Naturalist. (Vol. xxv. Nos. 6-9. Dublin, 1916.)
- Revue Française d'Ornithologie. (Nos. 88, 89. Orléans, 1916.)
- The Scottish Naturalist. (Nos. 55-57. Edinburgh, 1916.)
- South Australian Ornithologist. (Vol. ii. pt. 7. Adelaide, 1916.)
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XXXIV.—*Letters, Extracts, and Notes.*

Food of the Peregrine.

SIR,—Field-naturalists must have read with amazement Capt. Collingwood Ingram's statement ('Ibis,' p. 523) that Rooks are probably quite immune from the attacks of the Peregrine in a wild state. I live within easy reach of fifteen eyries, and find when visiting the "plucking places" that Rooks largely compose the bill-of-fare.

My friend, the late Mr. Ussher, examined more Peregrines' breeding-places than any man in the British Isles, and the following is taken from his book, 'The Birds of Ireland,' p. 140:—"Rooks are by far the most usual quarry in Co. Waterford"

Yours truly,

C. J. CARROLL.

Rocklow, Fethard,
Co. Tipperary.
21 July, 1916.

Australian Subspecies.

DEAR SIR,—I was glad to see Mr. W. R. Ogilvie-Grant's notes in reply to Mr. Gregory M. Mathews in the April issue of 'The Ibis' in which he says "Such a system of name-juggling and species-splitting as he adopts can only result in hopeless chaos."

We in Australia have protested personally to him against the indefinite multiplication of subspecies. I have worked at Australian Ornithology for over thirty years, and, in common with many of my co-workers in the field, am convinced that a large proportion of Mr. Mathews's subspecies are barely varieties. I myself have on several occasions described as subspecies forms that I should much prefer to note as slight variants from type, but not deserving of subspecific rank.

For instance, in the genus *Rhipidura* the species named by Latham "*rufifrons*" exhibits a gradual transition from the form occurring in Victoria with almost three-quarters of the tail orange-rufous to the form from Queensland described by Mr. North as "*intermedia*" "with less orange-rufous on basal half of tail-feathers." In the form from Anson Bay, Northern Territory, described by myself in 'The Emu,' July 1911, under the name of *Rhipidura mayi*, the characteristic orange-rufous coloration of the basal half of the tail-feathers is absent, except for a touch of rufous on the outer web. From a locality still further round the coast to the west, Gould described in his 'Birds

of New Guinea' yet another Australian form under the name of *R. dryas*, in which the tail-feathers are the same as in *R. mayi*, but the "spangled marks on the breast are absent." I have never seen a specimen of *R. dryas*, but Gould's description, as well as his figure in the work before quoted, conclusively show that the "spangled marks" are absent in *R. dryas*, whereas they are present in the other forms.

In my description of *R. mayi* in 'The Emu' of July 1911, I suggested that these were all one species and that as one travelled up the Australian coast to the north, and then after passing Cape York to the west a gradual transition took place, of which *Rhipidura fulvifrons* Lath. (*Howeavis rufifrons kemp* Mathews) is one extreme and the *Rhipidura dryas* Gould is the other.

Personally I think that this being the case *R. fulvifrons* should stand for the whole series, and the interesting steps in the gradual transition noted as varieties without bearing any change in the scientific name.

To illustrate a case where the trinomial system may be justified, I would cite that of "*Pardalotus affinis* Gould" from Tasmania, which is identical with the mainland form except that the tips of the primary-coverts are yellow instead of red and it is a little larger bird. I have not met with any intermediate forms, the replacement of the red by yellow in the insular variety being constant. Surely well-marked races, and not slight gradations in general shade of colouring, warrant subspecific rank?

I enclose a formalin specimen of *Rhipidura mayi* Ashby, of which you can make what use you like. If not wanted, please give it to the British Museum.

Yours sincerely,

EDWIN ASHBY, M.B.O.U.

"Wittunga,"

Blackwood, South Australia.

28 June, 1916.

Errata to the first part of Mr. Swynnerton's paper "On the Coloration of the Mouths and Eggs of Birds" (pp. 264-294).—Mr. Swynnerton writes: "I take this opportunity to correct a few somewhat important errors, due mainly to my illegible writing, that appeared in the first part of my paper (April, 1916, pp. 264-294). The omission of a passage accounts for one or two minor discrepancies, also for the mistake over *Phrynocephalus mystaceus*, one of several lizards that display bright mouth-colours when at bay, after the manner of an adult bird.

- Page 266, line 28. For "the lizard *Phrynocephalus mystaceus*" read simply "lizards."
- " 271, " 14. " "alone. It is in virtue of this that" read "alone, in virtue of which."
- " 273, " 17. " "common groups" read "colour-groups."
- " 273, " 18. " "memory and simplification" read "memory-simplification."
- " 274, " 17. " "direction" read "directive."
- " 277, lines 25-35. All in inverted commas (B. O. C. Bull. xxxv. p. 108).
- " 280, " 3-4. For "mouths" read "these mouths." For "often" read "in any case often."
- " 281, line 38 (last). Omit "or."
- " 282, lines 15-16. Omit "thus" and for "for" read "by the fact that."
- " 285, line 32. For "less strongly, as did" read "as did, less strongly."
- " 292, " 16. " "contingent" read "counteragent."
- " 294. Fig. 34 is *Laniarius manningi*. Fig. 41 is *Trochocercus bivittatus* Rehw.*

Three points in the Plate (p. 264, pl. vii.) may be mentioned. The twin spots in *Chloropeta* (fig. 9) do not, I think, in life slope in to the extent shown here (and quite likely in my own sketch); the dusky area of the tongue of *Pycnonotus* (fig. 15) is not seen at all during the action of 'wagging' that accompanies a demand for food, and

* The species described by myself as *T. megalolophus* (Bull. B. O. C. xix. p. 109, figured 'Ibis,' 1908, p. 96) proves actually to be this species of Dr. Reichenow's.

the tongue of nestling *Dryoscopus guttatus* (fig. 25, *a*) should be shown perfectly plain. The twin spots only *commence* to show after the young have left the nest, and it is some weeks more before they attain even the strength shown in fig. 25, *b*. Having mentioned fig. 15, I may add that, in view of a recent observation, the possibility of mimicry between mouths of *Pycnonotus* and *Hyphantornis*, guardedly hinted at in pp. 284-5, probably need not be considered at all.

I would like to compliment Mr. Grönvold on his success with a plate of a kind he has probably not undertaken before and which he had to execute under the difficult condition of shrunken spirit-specimens, with notes and rough sketches by a person too far away to be readily consulted."

Two new names given to British Birds.—The July number of 'The Auk' (p. 346) has a note that, in a recent number of 'Falco,' the organ of the eccentric Otto Kleinschmidt, there are descriptions of the British races of *Passer domesticus* and *Strix alba* under the new names *Passer hostilis* and *Strix hostilis*. The author, O. Kleinschmidt, states that his subspecies will probably have a hostile reception in their native country, and explains that he does not name them in the interests of British Ornithology but in accordance with the thoroughness of German science!

List of M.B.O.U. serving with H.M. Forces.—The names of two additional Members of the Union must be added to those already published in October last year and in January and April this year:—

Farquhar, J. H. J. Licut. Nigeria Regiment. In Nigeria and Cameroon.

Finch-Davies, C. G. (formerly Davies). Lieut. 3rd South African Mounted Riflemen. Served through the recent rebellion in the Free State and the campaign in German South-West Africa.

The following is a summary of the lists to date :—

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„ Egypt and Gallipoli.....	7
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„ Africa (East, South, and West). ..	6
„ the British Islands	37
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Prisoner in Germany	1
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The new General Index to 'The Ibis.'—The Index of all the generic, specific and subspecific names mentioned in the eighteen volumes of 'The Ibis' from 1895 to 1912, consisting of 513 pages, is now ready.

The compilation of this volume has entailed far more work and greater expense than was anticipated, but in spite of this and the increased cost of labour and materials due to the war, it has been decided to issue the Index at the special subscription price previously announced, viz., £1 1s. 6d. (including postage), and it is hoped every member will avail himself of this opportunity to secure the volume.

This special rate will apply only to those members who have already ordered copies and to those who fill up and return the order form recently circulated.

The volume is published at £1 12s. 6d. to the public.

* Col. Harington's name, included under this head in the former list is now added to those "killed in action."

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